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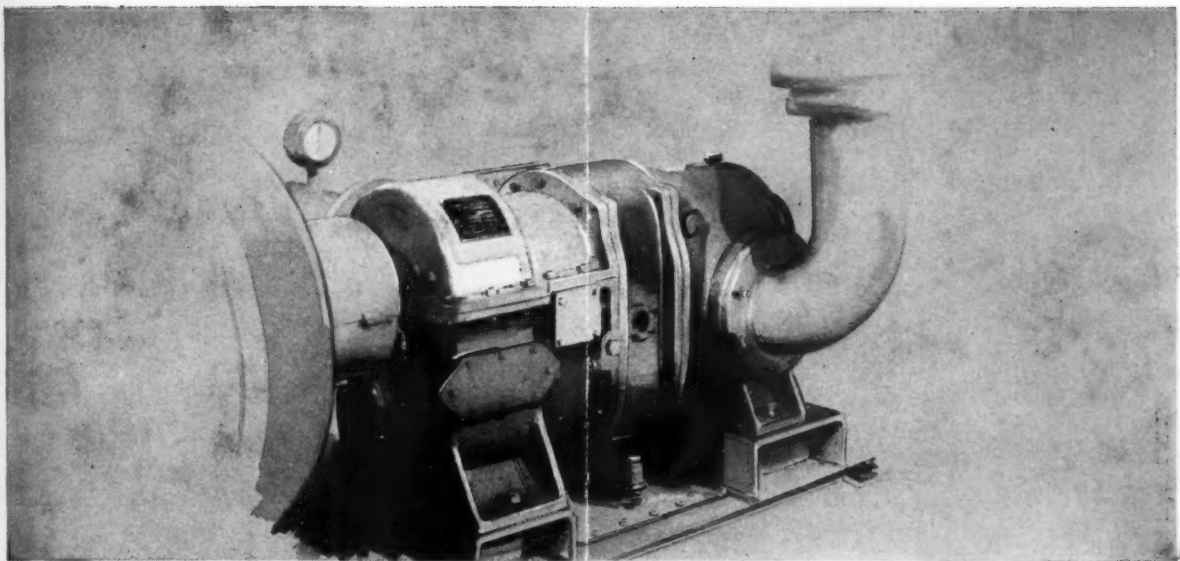
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# The Mining Journal

LONDON, OCTOBER 23, 1959

Vol. 253. No. 6479.

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# The Mining Journal

London, October 23, 1959

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## Strikes and Substitution

EVER since Man first discovered that certain operations could be performed more efficiently with metal than with stone, technological advances have been reflected in the introduction of new or improved materials. This process is a continuous one, but it has been very greatly accelerated in recent years, due not only to the quickening tempo of technological progress, but also to the shortages of the war and post-war years, when the flow of materials to consumer markets was dislocated by armaments production and government stockpiling programmes.

Even under conditions of normal supply, the boundaries of what might be termed the traditional fields of metal usage are constantly shifting, as one material supplants another by doing the same job more efficiently or more economically, or simply by being more easily obtainable. The advances made by aluminium, and subsequently by magnesium and titanium, have led to significant changes in the pattern of metal usage, as it existed before World War II. Apart from the rivalry between one metal and another—as natural and healthy a phenomenon as Darwins' survival of the fittest in the biological field—many metals are faced with growing competition from the young and rapidly expanding plastics industry.

Competition becomes particularly intensive at times like the present, when most materials are abundant and the consumer's freedom of choice is no longer limited by artificial restrictions and shortages. In these conditions, even relatively small price changes can have disproportionate effects on the ultimate pattern of metal usage. Moreover, with the years of high prices and shortages still a recent memory, users are biased in favour of materials which offer the prospect of market stability and assured supplies.

One reason for the determination with which the steel and non-ferrous industries in the United States are resisting the union's claims is reluctance to weaken the competitive positions of their own products by increased labour costs. The copper industry, for example, is very conscious of the competition from aluminium. Fortunately for the industry, despite strikes in both the United States and Chile, there has so far been no upswing in copper prices to levels which would encourage substitution. Moreover, the fact that an increase in aluminium prices seems unlikely to be long delayed is another reassuring factor for the copper industry.

Steel producers in the U.S. are struggling not only to hold the price advantage they now enjoy over most competitive materials, but also against the rising tide of lower-priced imports. They are also concerned about political attacks on past steel price increases and about the dangers of inflation. Hence the industry's insistence that any wage or fringe benefit improvement would have to be within the limits of a 2 per cent annual increase in labour costs.

Mr. Roger M. Blough, chairman of the United Steel Corporation, gave as one reason for his company's recent pledge to hold steel prices steady in the event of a voluntary settlement of the current strike, "the tough competition that steel faces from other materials produced domestically".

The extent of this competition is difficult to judge, since it extends to thousands of products ranging from railway wagons to



container caps. Though steel's competitors have still to capture any really large tonnage markets, continual erosion is taking place. It is estimated, for example, that pre-stressed concrete is currently displacing about 500,000-1,000,000 tons of steel a year. Though this amount may not seem unduly large in terms of total steel consumption, it is far from insignificant in relation to the 3,500,000 tons of fabricated structural steel now used annually in the U.S. The aluminium industry, in its search for tonnage uses to absorb its greatly increased production capacity, is invading a large number of steel's traditional markets. For example, Southern Railway recently took delivery of the first of some 1,205 all-aluminium trucks. Here the steel industry at present has a price advantage ranging from 15 to 35 per cent, but on the other hand Alcoa claims that aluminium electrical conduit can be installed for 8 per cent less than steel conduit, due partly to the saving in handling costs resulting from its lighter weight. Plastics, again, are coming into increasing favour for irrigation piping and plastic piping is beginning to attract considerable attention in the petroleum industry.

One way in which the steel industry is meeting the growing challenge from other materials is by developing steel products coated with aluminium or plastics in such a manner as to combine the advantages of two different materials in a single product. Steel's most important weapon, however, is its price advantage, which the industry is determined to preserve. The reluctance of steel producers to grant any wage increase without cost saving changes in local working practices is the more understandable when it is considered that producers of steel substitutes are gradually reducing steel's initial price advantage by developing easier and more economical methods of fabricating their own materials into end products.

Paradoxically, the prolonged stoppage of production which has resulted from the determination of the steelmakers to hold their price advantage (together, of course, with the equally intransigent attitude of the unions) is creating the very conditions which are most conducive to substitution, namely unavailability of the traditional material. And experience has shown that, although ground lost to substitution is not necessarily irrecoverable, its reconquest often calls for sustained and costly campaigns of sales promotion, through which consumers must be persuaded not only of the technical and economic advantages of the traditional metal, but also of the wisdom of reverting to a material which, however unavoidable the circumstances might be, has at some comparatively recent date been expensive and difficult to obtain.

Here again copper producers have been fortunate, for the copper strike — which has already led to the loss of some 165,000 tons of production—came at a time when supplies were abundant and after consumers had been given a breathing-space of several months to build up stocks. Moreover, the impact is now being cushioned to some extent by the effects of the steel stoppage on the general level of industrial demand.

Hitherto the effect of the steel strike on the industry's own customers has also been offset to a very large extent by heavy ordering prior to the shutdown, but the situation in the principal steel consuming industries is now becoming increasingly serious. It was stated earlier this month that if the mills reopened by mid-October, U.S. output this year should total 95,000,000 tons. Before the strike it was expected to equal or even exceed the record 117,000,000 tons achieved in 1955. Mid-October is now behind us, and the mills are still shut down.

Apart from the direct cost to the industry in production and profits, and to the workers in wages lost, the strike is playing into the hands of steel's competitors, by leaving them a clear field, besides opening the door still wider to importers. That sort of result is certainly no benefit to anyone who makes

a living through the production or processing of any metal which is struggling to retain and expand its markets, particularly in the highly competitive conditions currently prevailing in the United States.

### TIN MINING'S GREATEST PROBLEM

Yet another reminder has been given that the survival of the tin industry depends on the discovery of more mining land. The latest warning was delivered by Sir Douglas Waring, representative of the Malayan tin interests on the Federal Council, on the eve of his departure from Malaya after 25 years in the country to take up a position as deputy chairman of the London Tin Corporation. Sir Douglas emphasized that the price of tin was likely to go higher because no new rich mining land had yet been found. Bigger dredges might have to be used to work on old mines to get the remainder of the ore low down or in new areas with low grade ores. This would mean more work, less production, and higher cost.

So far tin had no competition from any other metal, plastic or alloy, said Sir Douglas, but if the price of tin kept rising the buyers would be forced to find another substitute, as in the case of rubber. He pointed out that the United States had spent much money on research to find a new alloy which would replace tin, and that an economic substitute for tin-plate was confidently expected in the near future. He believed, however, that the industries which used tin would not change over to a substitute so long as sufficient tin was available from the world producers, because the cost of the changeover would be very high indeed. If, however, Malaya was unable to provide her share of world tin production, the consuming industries would be compelled to make the change, and once this was done there would be no turning back.

Sir Douglas also expressed the opinion that it was a fallacy to try to reserve tin deposits in Malaya for the future. If tin ore deposits were held in reserve and production was allowed to decline, the inevitable would eventually take place. There would be an enforced changeover by consuming industries to other materials and tin would no longer retain its present position as an essential base metal in world usage.

Malaya's acute shortage of tin mining land originated from an almost complete absence of prospecting over a long period of years; first, during the pre-war period of restrictions on tin production; then, during the war itself; and post-war because of the Communists' activities in unopened areas. In recent years, improved security conditions have enabled more prospecting to be carried out, but the search for new areas has been hampered by the lack of a national land policy.

The report of an independent Land Administration Commission, which visited the Federation in the early part of 1957, was published in June last year, and the Federal Government lost little time in setting up a National Land Council, as recommended, to formulate, with the State Governments, a co-ordinated land policy. The need for the opening up of new land for prospecting and mining was considered by the Commission to be of great urgency.

Meanwhile reserves continue to be used up more quickly than new mining land is being found, and prospecting licences are not being issued fast enough to cope with demand. Since the Federation of Malaya became an independent State, Ministerial assurances have been given on several occasions that the Federation Government intended to do everything possible to further the development of the tin mining industry. In view of the urgency for making sufficient land available for prospecting, it is to be hoped that the Government will find it possible to adopt the recommendations of the Land Commission at an early date.



## GOLD OVER THE COUNTER

Since March, 1954, when the re-opening of the London Bullion Market brought respectability and status to the free gold market, great strides have been made in the liberation of gold from its wartime shackles. In January, 1956, Belgium reopened her Brussels gold market and in March of the same year the Canadian Government removed all restrictions on the sale and export of gold. Meanwhile in the U.S., dealings in gold coins were increasing considerably, trade being classified as numismatic.

Though residents in non-sterling countries were able to buy gold through the various bullion markets in Europe and elsewhere, no attempt was made to popularize its sale until the introduction of gold bar trading on the Toronto Stock Exchange. The success of this experiment was immediate and later it was announced that a Toronto brokerage firm was prepared to sell minted gold ingots on the instalment plan. These developments confirmed the existence of a large potential demand for gold and were followed by the first major certificate scheme, floated under the auspices of Samuel Montagu and Co., and the Bank of Nova Scotia. Earlier this year the South African Reserve Bank announced that it would negotiate the sale of standard 400 oz. gold bars to non-residents of the Sterling area. This was followed recently by an announcement that the Transvaal Orange Free State Chamber of Mines had completed arrangements for the sale of gold in the form of kilo bars.

By the end of August this year sales of South African gold bars, since the start of the scheme in May, had reached a total of £7,850,000.

Meanwhile the arrangements introduced by Samuel Montagu and Co. for the interchange of gold certificates had been extended by agreements with the Deutsche Bank and with Union Acceptances, Johannesburg, whereby such certificates can be interchanged for the delivery of metal in any of the countries covered by the scheme, and also with the French Bank of Southern Africa, a subsidiary of the Banque de l'Indochine. In the latter case, certificates are to be available throughout the world-wide branch and agency organisation of Banque de l'Indochine. The fact that all Montagu schemes are linked by interconvertibility prompts the thought that here is machinery which, conceivably, could be regarded as a step towards that international gold-backed currency which, if still remote, appears to be the logical solution of the world's monetary difficulties.

The arrangements for bullion trading have now been simplified and centralized by the formation of a new company in South Africa, known as Bullion Merchants of South Africa Ltd., which is sponsored by Union Acceptances Ltd., in conjunction with Samuel Montagu and Co. Ltd. and Mocatta and Goldsmid Ltd. The new company, which has been appointed an authorized dealer in gold by the Reserve Bank of South Africa, will deal in gold in the different bar forms and in interchangeable gold certificates. Its registered office is Pearl Assurance House, 55 Fox Street, Johannesburg.

## MINERALS DEVELOPMENT IN INDIA

Production targets for various minerals under India's third Five-Year Plan have been tentatively fixed, according to a recent statement by Prof. M. S. Thacker, Secretary to the Ministry of Scientific Research and Cultural Affairs, Government of India. Prof. Thacker said that over \$850,000,000 had been allocated for mineral development under the second Five-Year Plan, and large sums would be made available in further Plan periods.

Preliminary discussions have taken place with the Polish authorities regarding their offer of assistance in the develop-

ment of copper mining in India, but no final decision as to whether to accept this offer has yet been made. Meanwhile detailed investigation of the Khetri copper mine has been completed. It is hoped to produce copper from Khetri and Sikkim by the end of the second Five-Year Plan.

Investigations carried out by the Geological Survey of India in part of the South Karnapura coalfield in Bihar have revealed the existence of 21 coal seams with a total reserve placed at nearly 138,000,000 tons. Three of the seams discovered are reported to be of considerable thickness.

Lignite has been struck at a depth of 16 ft. at Jayankondan in South India, at no very great distance from the Neiveli lignite seam. The industrial face of South India would be changed, it has been stated, if further investigations proved the existence of lignite on a wide scale.

Huge deposits of borax in the Pugga Valley of the mountainous Ladakh region of Kashmir State are to be exploited soon by the Kashmir Government. The Pugga Valley is the only district in India where borax is known to exist. Exploitation has hitherto been prevented by the lack of transport facilities. It is now planned to transport the borax after purification by air to Srinagar.

The need to avoid any overlapping and duplication of work by research and other agencies engaged in the various aspects of minerals development in India was recently stressed by Mr. P. B. Rama Rao, retired Director of Geology in Mysore and a former Director of the Indian Bureau of Mines.

## COLLIERY EXPLOSIONS

In 1957, as a result of concern over the number of explosions in British coal-mines in recent years, the Safety and Health Committee of the Coal Industry National Consultative Council appointed a special sub-committee to consider the problem of explosions underground. Terms of reference of the sub-committee were:—

"(a) To consider the summaries prepared by the Ministry of Power of the circumstances, conclusions and recommendations in respect of the recent sequence of explosions:

"(b) to report to the Safety and Health Committee of the CINCC on the basis of the information considered in (a):

"(i) the lessons to be learned from the explosions and the steps which could be taken to prevent similar happenings in the future;

"(ii) the measures which could be taken to bring the findings referred to in (i) to the notice of managers, officials and workmen."

This sub-committee, under the Chairmanship of Sir Andrew Bryan, has just published a report of its findings and suggestions after considering a series of thirteen recent explosions. The conclusions are given under the following main headings: Ventilation; Strata control; Care and maintenance of equipment; Human factors; Other mining factors. Although the report does not reveal any serious deficiency in existing safety regulations, it does draw attention to the fact that certain hazards have assumed greater significance than formerly. This is emphasized in the section dealing with ventilation of mines and is particularly true in respect of gas layering. The report suggests several lines of research in various fields as well as pointing the way to safety improvements underground in the light of existing knowledge.

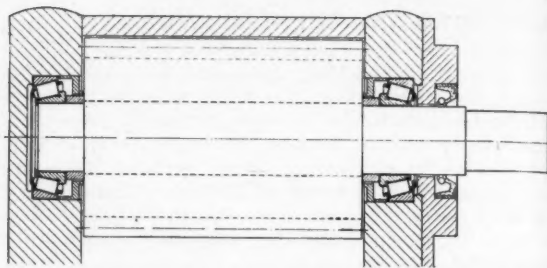
Above all the report stresses the supreme importance of the human factor in mining and urges that the moral approach to the problems of mine safety should be given greater emphasis in all education and training of new entrants to the industry. It is a useful document that should be read by all connected with the industry.

# Rolling Bearings in Compressed Air Motors for Mining Machinery

**L**UBRICATION, the most important maintenance feature of any machine, requires particular attention where underground work is concerned. The mine machine is often inaccessible, preventing adequate servicing, while sometimes the lighting conditions are bad, often only a miner's lamp. The removal of protective covers during inspection creates a risk of coal dust from the adjacent workings or even from the dusty atmosphere contaminating the lubricant. Machines for underground work must therefore be effectively sealed for long term operation.

For satisfactory performance reliable bearing schemes are essential. Breakdowns often involve difficult transportation problems for the carrying out of repairs, thereby lengthening the time out of service.

If all this is borne in mind when designing machines for underground operation it is evident that only rolling



Rotor of compressed air motor fitted with taper roller bearings

bearings can be considered for the bearing schemes. Only in less important bearing positions such as in control units, etc., is it possible to use plain bearings.

Rolling bearings take up very little space, especially axially, and the bearing housings are therefore small. Since each machine has numerous bearings a considerable saving in weight is achieved by using rolling bearings.

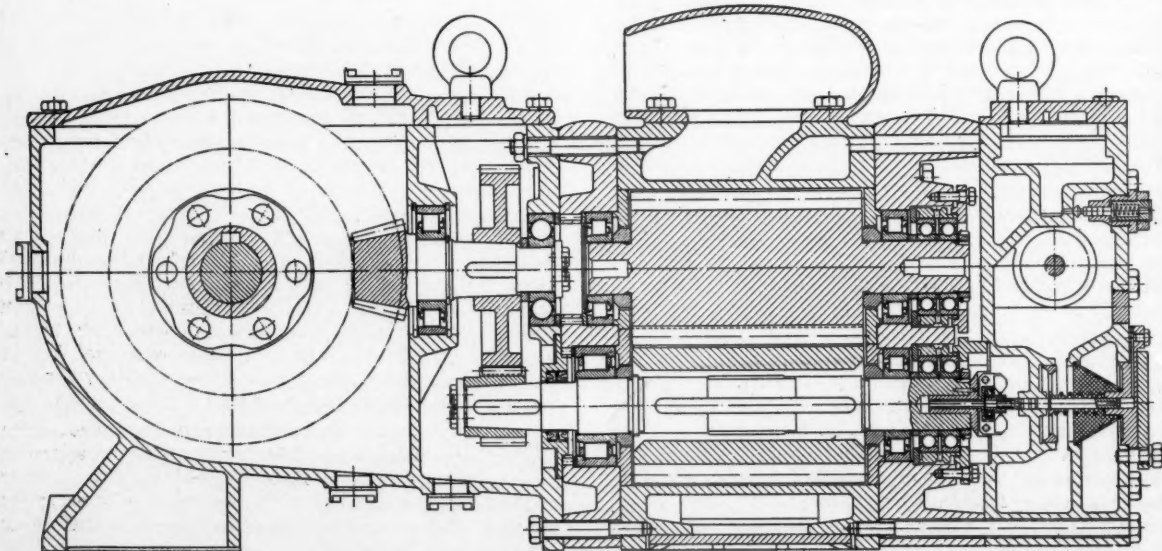
These bearings require very little attention. Often only a very small quantity of lubricant is needed to prevent hot running and the risk of damage is lessened if the servicing interval is not strictly observed. Plain bearings,

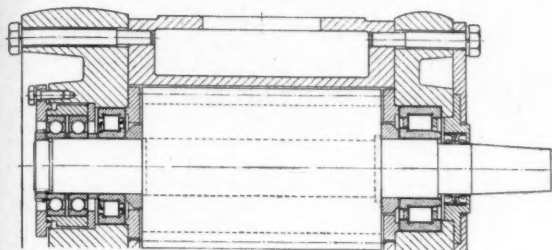
*This article is condensed from "The Ball Bearing Journal", No. 4, 1958, and is based on material originally supplied by Demag, Germany*

on the other hand, may be damaged because of some minor interruption in the supply of lubricant. Rolling bearings remain free from foreign matter because the bearing housings are effectively sealed. Fresh lubricant is rarely required and when it is, can be replenished by grease gun through lubricating nipples incorporating non-return valves. Premature failure due to the ingress of dirt is therefore greatly reduced.

With compact rolling bearings of standard dimensions it is not difficult to obtain different combinations to carry

A bearing scheme for compressed air driven, geared motor





Rotor bearing scheme for medium and large compressed air motors

thrust and radial loads within the limits of the available space.

Thousands of compressed-air driven, geared motors have been supplied and for over 30 years have been working underground with satisfactory results. The compact design of this motor is only made possible by using rolling bearings. The clearance between the rotor and its housing both peripherally and axially must be a minimum. The smaller the gap between the rotor and its housing the lower is the consumption of compressed air, and the bearing scheme must ensure that this gap does not change appreciably over a period of time. Even very slight wear in the bearings, which can easily occur in plain bearings and which in many other types of machine may not have any directly detrimental effect on operation, may result in a compressed-air motor being damaged or operating inefficiently. If the rotor comes into radial or axial contact with its housing during operation because of an increase in bearing clearance the friction will rapidly generate heat causing local expansion of the material and the probable seizure of the rotor.

Compressed air is an expensive commodity making the motors in themselves uneconomical, but they are nevertheless very important drive units for underground operation, being shock resistant and easy and safe to operate. They can be set to the required speed by simple cock or slide devices and can be reset quickly for clockwise or anti-clockwise rotation. In addition, they improve the heating and ventilation conditions, a matter of particular importance in coal mines.

Despite all efforts to use electrical equipment, compressed-air motors cannot be dispensed with particularly in coal mines where an electric spark could have disastrous results. For economic reasons, however, it is necessary to keep the consumption of compressed air to a minimum. As mentioned above the critical factor is the necessary minimum clearance between rotor and housing which although small must be sufficient to eliminate the risk of seizure during starting. An inexpensive and reliable rotor bearing scheme with a specified minimum clearance is difficult to conceive without using rolling bearings. The negligible wear of these bearings makes it possible from the outset to keep the gap as small as the temperature difference between the rotor and the housing will permit.

The rotor bearing scheme in a compressed-air motor is an interesting example of the application of rolling bearings. Fitting the rotor with separable bearings, e.g., cylindrical roller bearings or taper roller bearings, offers certain advantages. When the motor is dismantled the inner and outer rings of the bearings remain mounted so that even where dismantling and assembly operations are frequently carried out the housing and shaft bearing seatings are protected. The interference fit reduces the clearance in the bearings and these are therefore selected with an initial clearance which will reduce to that required for smooth running. Radial location of the rotors can thus be obtained comparatively easily, but it is more difficult to arrange

the axial location so that the gaps between the ends of the rotors and the covers remain constant. The following description is of two different rotor bearing schemes, which have given good results over many years.

In small motors the rotors are carried by taper roller bearings. These give good radial and axial location within the smallest possible space and in addition make rapid and simple dismantling and assembly of the motor possible without the need for readjustment. Spacers between the inner rings and the rotor locate the inner rings and ensure that the bearings have the required clearance. With this bearing scheme only four rotor bearings are required, favourably influencing the cost of the motor.

The motor housing and rotors are manufactured to certain specified tolerances and selective assembly coupled with the use of taper roller bearings and spacers gives a uniform and guaranteed fine clearance both peripherally and at the ends of the rotors without having to mount or dismount the rotors for adjustment. It will be appreciated, however, that initial adjustment has to be carried out very carefully.

In medium and large motors a special bearing arrangement is used in which axial location is taken care of by different bearings from those used for radial location. Cylindrical roller bearings of type NJ are used for radial location, although if the inner ring cannot move axially bearings of type NU may be used. The risk of the rings becoming loose is eliminated by machining the bearing seatings on the shaft and in the housing to give the bearing rings an interference fit. The normal radial clearance is reduced during mounting giving the required gap between rotor and housing.

Cylindrical roller bearings can carry only very small thrust loads, or none at all. Although the bearings used in this design are of type NJ they are mounted so that they have axial clearance and the thrust loads are carried by a special bearing unit incorporating two deep groove ball bearings. The outer rings of these bearings are adjusted in relation to each other so that the bearings have virtually no clearance; this is achieved by relating the width of the sleeve, which forms the housing of the unit, to the widths of the bearings and the spacer between their inner rings. These bearings are paired together to form a unit before the motor is assembled, and are mounted with a push fit on the rotor shaft and secured axially with a nut and a locking washer. The whole assembly is held in the motor housing by an end cover. The deep groove ball bearings do not carry any radial load as the outer sleeve has radial clearance in the bearing housing.

The rotor is located in its housing by assembling the motor without locating the thrust bearing unit axially. The total axial clearance at the side face of the rotor is then measured with a dial gauge; an equal distribution of this axial clearance is obtained by adjusting the width of the spacer fitted between the inner ring of the cylindrical roller bearing and the deep groove bearings.

The compressed-air driven, geared motor is only one example of the versatility of rolling bearings in machines which operate underground, and as the type of motor described is an essential component of numerous machines employed in mines the importance of rolling bearings and their effect on reliability can be readily appreciated.

Examples of machines using compressed-air driven, geared motors include coalcutters, belt conveyors, chain conveyors and haulage belt conveyors with their particularly low overall height. The latter items must sometimes be able to operate in seams having a height of about 15 in. Rolling bearings are, therefore, indispensable in achieving the low heights required for underground machinery while maintaining an adequate carrying capacity.



## India's Heavy Mineral Sands

THE coastline of India stretches for nearly 4,500 miles and, though not throughout its whole length, some parts of it are quite rich in mineral resources, which call for more attention. The smallest state of Kerala is fortunate enough to have the richest portion of the coastal tract from mineral-economics point of view, since the coastal region stretching from Quilon to Cape Comorin, is not only the richest mineralized area of thorium and rare-earth salts in India, but it also has the biggest deposit of heavy beach sands, which contain minerals like monazite, rutile, ilmenite, zircon, sillimanite, garnet, etc.

For thousands of years, the heavy particles of the above-mentioned minerals have been washed and accumulated in the south-west coastal tract of India and the minerals obtained therefrom, after being separated from other ingredients, are used in many industries profitably.

Geologists believe that these heavy beach sands are the richest in the world and they will not be exhausted as every year the deposits are replenished and further enriched by the wave-action of the sea. In India, heavy beach sands occur in the Kerala coast, Malabar, Ramanathapuram, Tanjore, Bimplipattam and Ganjam coastal tract. Ilmenite sands have also been found at Bombay coast, stretching from Purangadh to Malgund and a little off, a distance of 25 miles. No detailed investigation has been carried out throughout the 4,500 mile long coastal tracts of the country and new rich deposits are likely to be located.

In India, the different fractions of the beach sands are recovered mainly from Kerala State, the important centres being Koithottam, Chavara, Quilon and Manavalakurichi in Madras. M/s Hopkins & William (Trav.) Ltd., and M/s. F. X. Pereira & Sons (Trav.) Ltd. are working on the beach sands. India occupies second place in the world production.

The different fractions of minerals recovered in India, are the following :—

	per cent	
Ilmenite .. ..	65-75	} Analysis of Chavara beach sands.
Rutile .. ..	3-8	
Zircon .. ..	5-10	
Sillimanite .. ..	5-10	
Quartz .. ..	5-10	
Monazite .. ..	1-2	

The element-content and their percentages in different fractions are as follows :—

Ilmenite 59 per cent $\text{TiO}_2$	} Analysis of Chavara sands.
Rutile 95 per cent $\text{TiO}_2$	
Zircon 65 per cent $\text{ZrO}_2$	
Sillimanite 63 per cent $\text{Al}_2\text{O}_3$	
Monazite 8 per cent $\text{ThO}_2$	

An unusual green monazite from Travancore was found to contain 29.4 per cent  $\text{ThO}_2$  and 6.5 per cent  $\text{U}_3\text{O}_8$ . Samples from a neighbouring locality were recently analysed by the Geological Survey of England and assigned the name of cheralite.

It is not an easy job to separate the above-mentioned fractions. The heavy beach sand is first screened through 30 mesh sieve, after drying in sun, to get rid of the associated moisture. Limestone and other unnecessary materials are screened off in this stage. Then the sand is completely dried and passed through Wetherill and other types of electro-magnets where different fractions are obtained under different intensity. Magnetite is separated first and the second fraction contains 91-98 per cent pure ilmenite. Ilmenite is then made free of garnet particles by gravity-table. Then the remaining

*This article, by A. K. Mukherjee of the Indian Bureau of Mines, is reproduced from the Independence Number of Eastern Metals Review. The article has been abridged.*

sand is put under very powerful electro-magnets and 60 per cent pure monazite is separated, which is again treated in wet and dry concentrating tables and high intensity electro-magnets. Finally by putting the concentrates in dry tabling process, 98 per cent pure monazite is recovered. 98 per cent pure sillimanite is obtained from the tailings by flotation and gravity concentration. From the end-product 98 per cent pure rutile is recovered by flotation and electro-static concentration.

An analysis of monazite from Kerala is as follows :—

	per cent
Thoria ( $\text{ThO}_2$ ) .. ..	8.1
Ceria ( $\text{Ce}_2\text{O}_3$ ) .. ..	30.6
Lanthanum Oxide ( $\text{La}_2\text{O}_3$ ) .. ..	15.7
Prasidimum Oxide ( $\text{Pr}_2\text{O}_3$ ) .. ..	2.9
Neodimium Oxide ( $\text{Nd}_2\text{O}_3$ ) .. ..	10.5
Europium, Terbium, Lanthum, etc. ( $\text{X}_2\text{O}_3$ ) .. ..	0.7
Yttrium ( $\text{Yt}_2\text{O}_3$ ) .. ..	0.4
Other rare-earths ( $\text{Yt}_2\text{O}_3$ ) .. ..	0.1
Alumina ( $\text{Al}_2\text{O}_3$ ) .. ..	1.0
Lime ( $\text{CaO}$ ) .. ..	1.0
Iron ( $\text{Fe}_2\text{O}_3$ ) .. ..	0.3
Uranium ( $\text{U}_3\text{O}_8$ ) .. ..	26.2
Phosphoric acid ( $\text{P}_2\text{O}_5$ ) .. ..	2.4
Silica ( $\text{SiO}_2$ ) .. ..	2.4

The Travancore Government (now Kerala), made a contract with the two French concerns, "Societe Banques Marocaines de Credit" and "Societe des Produits Chimiques des Terres Rares", and the first Indian processing unit, "The Indian Rare-Earths Ltd.", was established in 1950 at Alwaye, with a capacity of processing 1,500 tons of monazite annually. Production dates from December 24, 1952. This factory produces mixed-earth, viz., cerium chloride, carbonate and hydroxide. As a by-product, tri-sodium phosphate is obtained, but perhaps the most important by-product is thorium hydroxide (thorium cake).

The Atomic Energy Department of the Government of India has established a thorium plant at Trombay for processing and use of thorium, and this plant has been in commission since 1955. It is one of the biggest single-unit thorium plants in the world and after meeting the full demand of the Indian gas-mantle factories, the surplus production is exported to the Far East and European markets. The Indian Government has taken the decision to establish a plant for recovering uranium from its chloride, which is obtained as a by-product in thorium processing. As Government's Agents, Indian Rare-Earths Ltd., has taken up the work and it is expected that production will commence soon.

The world's largest deposit of ilmenite is that of the coastal tract of Kerala and a high percentage of the production of ilmenite from beach-sands is exported. Travancore Government has established "The Travancore Titanium Products Co. Ltd.", at Trivandrum, for the processing of ilmenite. This plant processes about 3,000 tons of ilmenite for use as white pigment in the country.

The large deposits of zirconium in India make it second only to Australia among world zirconium producers.

The other constituents of the beach sands are not so important commercially as monazite, ilmenite, rutile or zircon. They comprise sillimanite ( $\text{Al}_2\text{SiO}_5$ ) garnet and quartz sands.

FROM the steady stream of news items relating to coal-mining which appears in the Soviet newspapers have been extracted the following recent items.

Twelve years of experiment at the Vorkuta coalfields, in the Soviet Arctic, have ended with success. Safe methods of mining coal front seams only just below the beds of many Arctic rivers have been devised and proved, states the report. In Vorkuta alone, this will mean an extra million tons of coal

continuously the PD-IM drives down into the ground at a rate of 600 feet a month, leaving behind it a concrete-lined shaft about 21 feet in diameter.

A giant excavator, designed and now being built at the Novo-Kramatorsk Engineering Works, in the Ukraine, will be able to excavate over 3,900 cubic yards of earth and shift it to a considerable distance in an hour. Intended for use in opencast mining, this machine consists of a rotor excavator with a system of conveyor belts which will eliminate the need for moving earth by trucks on rails. The rotor excavator, which is as high as a building of 14 stories, will clear a layer 130 feet thick by means of a multi-bucket mechanism. The earth excavated will be removed from the excavator continuously by a system of belt conveyors with a total length of over 2½ miles. Extensive use will be made of various automatic devices and of industrial television equipment, in its control. It is estimated that, as compared with the single-bucket excavators which it will be replacing, the machine will effect an economy of between 30,000,000 and 35,000,000 roubles a year.

## Developments

a year, without opening up a single new pit. The importance of this development lies in the fact that a great part of the coal in the Pechora Basin, embracing Vorkuta, where the located reserves are immense, lies under the rivers.

Scientists at the Dnepropetrovsk Mining Institute have developed bits of a new type for butt-end rotary drilling with

### Modernization Pays

That modernization pays, is the conclusion reached by the authorities of the Donbas coalfield, where it is reckoned that the boosting of output by about one-third will pay for itself in a matter of six or seven years. Modernization there has increased labour-productivity by three-quarters, with the result that the cost of production has been reduced by one-third.

The propagation of improved methods of working and of management which have proved successful in one coalfield to others where production is still lagging, is being effected by the volunteering of managers and key workers of outstandingly successful pits for temporary transfer to backward pits, with

## in Russian

mounted electric drills. It is claimed that drills fitted with this new bit will be the first in the world which can be used for drilling blast holes in hard rock by the rotary technique.

An air-conditioning unit with a capacity of 15,000,000 kilocalories an hour is to be installed in a new pit, Butovskaya-Glubokaya, which is now being sunk in the Donbas coalfield. This gigantic installation will ensure normal working conditions for miners at a depth of 3,750 feet. This is the depth of the Butovskaya-Glubokaya pit, which will be the deepest in the Donbas, but six others more than 3,000 feet deep are now being sunk in the Stalino-Makayevska area and 15 others are projected.

A mine in which the coal will be cut, transported and cleaned by water is being made near the town of Donetsk, in the Krasnoarmeisk coalfield. With an output of 20,000 tons a day, it is expected to produce coal at about one-third of the cost of that extracted from other mines in that coalfield.

### Automatic Operation

A remarkable four-storey machine, weighing 140 tons, is being used for sinking the main shaft of a new colliery in the Karaganda coalfield. Known as the PD-IM, this machine is almost completely automatic, and is controlled by one man. At the pressure of the operator's finger on a button, cutting discs at the bottom of the machine bite into the earth below and automatically load the spoil into skip-hoists which lift it to the surface. After cutting to a depth of about 40 inches, the cutters stop, and the machine eases itself further down into the shaft it is creating by means of steel cables. Simultaneously with this, reinforced concrete sections for lining the shaft are fed to the lower platform. Repeating this process

## Mining

the object of bringing them up to the advanced level. This action is indicative of a remarkably high spirit of *esprit de corps* in the Soviet mining industry, comments the report, since it always involves a loss—sometimes a very considerable loss—of income for the volunteer, whose income is closely linked with the output of the pit where he works.

## Machinery

An example of this is afforded by the case of one Pyotr Borodin, under whose management the North Privolnyansk pit exceeded its quota last year by 20,000 tons, for which achievement all employed there received a handsome bonus, and who has gone as a volunteer to "ginger up" a pit in Kadievka, which underfulfilled its last year's quota by 11,000 tons.

## QUEENSLAND'S URANIUM TOWN

**A**S a project, Mary Kathleen in far northwest Queensland could well be the prototype for future mining settlements in other similarly difficult environments, isolated by hundreds of miles from the nearest seaport and miles from the nearest railway. The town cost £A13,000,000 to build and its inhabitants live as pleasantly as most other Australians, except for heat.

The Mary Kathleen uranium deposit was discovered by chance in 1954 by a syndicate of eight prospectors. Mary Kathleen Uranium Ltd., was formed to develop the deposit, and the present approximate shareholding of this company is — Rio Tinto and its associates 56 per cent, Australasian Oil Exploration Ltd. 35 per cent and the Walton-McConachy syndicate nine per cent. On February 24, 1956, a contract to supply 4,500 s. tons of uranium oxide was signed with the United Kingdom Atomic Energy Authority. Revenue from this contract is expected to be £A40,000,000.

Isolation and terrain difficulties were the major problems to overcome in developing Mary Kathleen into a mining centre. Mary Kathleen is more than 500 miles from Townsville, the nearest seaport. The only rail link with Townsville is by a single-track railway between Townsville and Cloncurry, which is 45 miles from Mary Kathleen. There were no roads. Water could be obtained only by sinking wells which could not supply sufficient for a large

community or an ore treatment plant. There were no power supplies or telephone communications in the area, and the nearest hospitals and sources of food supplies were Mount Isa and Cloncurry.

The township of Mary Kathleen, involving housing and facilities for 1,000 people, was given first priority. Built four miles from the mine, the houses and community buildings are designed to minimize the heat. Amenities such as a hospital, store, sporting oval, swimming pool, cinema and open air beer garden are provided. The only buildings not owned by the company are the banks, the post office, the two churches, the school and the police station. A market garden and orchard supply fresh vegetables and fruit and they are doing so well that they have a surplus.

At the same time as the construction of the town, a dam to give three years' supply of water for all purposes was built on the nearby Corella river, which is normally dry and runs only for short periods if and when there is a storm in the wet season. The dam is 480 ft. wide and 75 ft. high and, when filled to the 60 ft. level, will contain 3,400,000,000 gallons of water. An eight-mile pipeline brings the water to the township. A power station on the site of the treatment plant supplies both industrial and domestic power. Construction of the treatment plant itself began in June 1956.

The whole building operation — the town, the mine, the treatment plant and the dam — took from April 1956 to May 1958, less than 2½ years. The plant began working on June 3, 1958 and the first oxide was produced on June 19. This achievement is the more remarkable because most of the materials for building had to be carried over a 45-mile stretch of road that was little better than a rough bulldozed track. A good road has been built since.

A view of the open cut mine at Mary Kathleen. The cut has formed a hill about 400 feet high. Uranium-bearing ore is treated at the plant in the centre of the picture, partly obscured by a hill. Mary Kathleen Uranium Ltd., put down 75 miles of un-sealed and 15 miles of sealed roads in the area





# Research on Silicosis

**T**HE Study of the Claimant for Silicosis Compensation is in three parts. Part I, by John V. Skendall, Safety Director of Harbison-Walker Refractories Company, Pittsburg, United States, deals with the legal aspects of the study of the silicosis claimant by the employer.

After referring to the variance of the workmen's compensation laws in the different American states and the variations in the definition of "silicosis" and "silica", Mr. Skendall listed the factors to be investigated in a silicosis claim as: Amount of dust in the air at the working place and breathed by the individual; the percentage of free silica in the dust, bearing in mind permissible values; dust particle size; history of adequate exposure to silica (duration and constancy of the exposure) and individual susceptibility. Significant also are chest X-rays of other employees on the same job for similar or longer periods.

Free silica determination in any material may be obtained by X-ray diffraction, spectroscopy, petrography or chemical analysis. X-ray diffraction was thought preferable.

With regard to particle size, Mr. Skendall said that it was believed that free silica particles below five microns in size were most harmful and that there was considerable evidence that the majority of particles entering the lung were much smaller.

It was generally believed that, on the average, at least ten years were required to produce a significant degree of silicosis. Studies indicated, however, that the time needed to produce silicosis was becoming longer. This was probably due to improved engineering control, better housekeeping and the increased use of aluminium prophylaxis. Also, the exposure time required to produce the disease varied with the working conditions and individual susceptibility. Jobs varied greatly, some being notorious for producing high concentrations of silica dust. Dusts also varied greatly, some admixed dusts accelerating the fibrosis producing qualities of silica and others minimizing fibrosis by chemical or antidotal action.

The following were considered by Mr. Skendall as important in any study of a silicosis claimant: age and complete physical examination data going back to the time of employment; work history—specific occupations, including, if possible, dust exposure on each of past jobs; absenteeism record; information from foreman regarding job performance; a series of X-rays, dating back to time of employment; retention of a consulting roentgenologist to review all X-ray films; evaluation of pulmonary function; determination of degree of disability; legal considerations, such as workmen's compensation laws in respect of exposure time required to qualify for silicosis benefits, liability of previous employer/s, statute of limitations, distinction, if any, recognized between silico-tuberculosis and tuberculo-silicosis and any special restrictions whereby silicosis benefits might be subject to limitations not placed on other occupational diseases (under various U.S. state laws).

In case of doubt or incomplete data as to the claimant's physical condition, Mr. Skendall considered a thorough physical examination to be essential.

In Part II of the study, Leslie H. Osmond, M.D., F.A.C.R., in his paper, *Some Considerations Concerning the Roentgen Diagnosis and Conditions that may Stimulate It*, dealt with the diagnostic approach, claiming that roentgenographic examination of the chest was the most precise method available for demonstrating pathological changes within the lungs, that diagnosis of silicosis should

*The article appearing herewith comprises a précis of a third and final set of papers presented at a McIntyre Research Foundation Conference on Silicosis and Other Pulmonary Diseases held at Toronto on January 27, 28 and 29, 1958. Reviews of previous papers presented at this Conference appeared in our issue of May 23, 1958*

be based upon the history of adequate exposure to silicon dioxide and that final diagnosis must depend upon correlation of the roentgen findings with all other essential data, though, even so, incorrect interpretation might result from conditions that produce changes in the lung that simulate those seen in the various phases of the silicotic process. When the diagnosis has been established, physical examination and certain laboratory tests are required to determine whether or not any disability has resulted and the degree thereof. Dr. Osmond said that, while in accord with the simple classification of the disease into simple silicosis and silicosis with infection, he used the grouping developed to a large extent by Gardner and Sampson, which subdivides the disease into three stages according to the number and size of the nodular shadows.

He said that tuberculo-silicosis was seldom seen now since roentgen examination eliminated TB contact with the silicotics and potential silicotics. When, however, TB complicates silicosis it may manifest itself either by the development of silicosis with tuberculosis or of tuberculo-silicosis. As in the case of simple silicosis, Dr. Osmond described the lung conditions and the X-ray results to be expected with TB complications. He also described the lung conditions and X-ray results to be expected from other non-silicosis diseases which he grouped under benign pneumoconioses, chemical pneumoconioses and the many conditions productive of changes similar to those seen in silicosis but unassociated with the inhalation of dust.

In Part III of *The Study of the Claimant for Silicosis Compensation*, J. W. G. Hannon, M.D., F.C.C.P., gave a treatise on the clinical study of the applicant for silicosis compensation. He said that such a study could present a simple or complex problem and its complexity was assisted by the fact that medical condition of silicosis assumed a legal status in compensation courts.

A number of factors were quoted by Dr. Hannon as requiring consideration in studying an applicant's case. The problems of accurate X-ray diagnosis of silicosis and proof of adequate exposure to silica must be reviewed before proceeding with the clinical examination. The symptoms of dyspnea, cough, tightness in the chest and fatigue should be studied and a careful industrial history should be taken to determine actual exposure to silica and the types and severity of the silicosis occurring in particular plants should be known. A thorough physical examination should be made and the X-ray films of the case reviewed. Great care should be taken in interpreting mottled shadows of the lung as being due to the inhalation of silicon dioxide and special studies may be needed in the differential diagnosis of silicosis including tests to exclude conditions that simulate silicosis.

Evidence of silicosis having been proved to the examiner's satisfaction, he should then estimate the amount of pulmonary disability present. Experience was a great help in judging this but many and varied pulmonary function tests were available. These included (1) examination of the applicant at rest and determining tidal air, complimentary air, reserve air, vital capacity, residual air, timed vital capacity and the functional residual capacity; (2) exercise tests, including primary and secondary lung exercises and

(3) arterial blood studies. Impaired pulmonary function occurs in many grades of severity and does not necessarily mean partial or total disability for work.

#### Studies of Aluminium Agents

*The Antidotal Capacity of Aluminium Against the Histotoxic Action of Quartz*, was the final paper delivered at the McIntyre Conference was by G. W. H. Schepers, M.D., D.Sc., and reported a study completed at the Saranac Laboratory for the McIntyre Foundation. The purpose of the experiments was to evaluate the antidotal properties of four aluminium agents, one of which was McIntyre aluminium powder (M38) as now produced under controlled conditions. It offered further laboratory evidence of the efficacy of oxidized metallic aluminium in the prevention of silicosis, the work indicating that the finer particle size and great purity of the new powder presently being used may be still more efficient in counteracting the influence of silicon dioxide dust. The intrinsic inertness in animals of metallic particulate aluminium and oxidized aluminium was also demonstrated.

In a recent study the author had shown that the quantitative histological reaction to particulate crystalline free silicon dioxide may be precisely determined by serial examination of lesions provoked by subcutaneously implanted quartz dust (1-3 $\mu$ ). This suggested the possibility that the potential antidotal capacity of an aluminium agent against the pathogenic action of quartz may be tested by introducing the two substances simultaneously at the same subcutaneous site.

The test substances used included: quartz particles (Silex 1-3 $\mu$ ): 5,2,0.5, 0.1, 0.01 mg., metallic aluminium (McIntyre Foundation DR): 1, 0.9, 0.2, 0.1, 0.01, 0.006, 0.002 mg., oxidized aluminium (J. W. G. Hannon M 38): 1, 0.9, 0.2, 0.1, 0.01, 0.006, 0.002 mg., colloidal aluminium hydroxide (Saranac Laboratory A1 (OH)<sub>3</sub>): 1, 0.9, 0.4, 0.2, 0.1, 0.01, 0.002 mg., precipitated hydrated aluminium (Aluminium Company of America H<sub>1010</sub>): 1, 0.01 mg., and normal saline as a control and suspending agent.

The quartz particles and aluminium agents were studied in various ratios of which only the more significant combinations were reported. Biopsies were taken at 1, 12, 24, 72, 144, and 1,008 hour intervals. All histologic sections were cut at 5 $\mu$  and stained by hematoxylin and eosin. In crucial instances, sections also were stained for collagen by Mallory's stain, for elastic fibres by Weigert's method and for reticulum by the Foote Modification of Bielchowsky's technique. The quartz particles were derived from commercial Silex by standard sedimentation procedures. All the experiments were conducted on the same batch of material. Immediately before use, the particles were suspended in normal saline in the desired concentrations and heat sterilized.

Used both as received from the McIntyre Research Foundation and after secondary ball-milling, the metallic aluminium was similar to that with which the original animal experiments of Denny, Robson and Irwin were conducted. Although the designation metallic aluminium was used, the individual particles of each, theoretically, were covered by several molecular layers of oxygen. The aluminium had been milled in a stearate base in order to obviate oxidation, and the product, as received, was a grey powder with a dull metallic sheen. Immediately prior to use, the powder was washed in chloroform and thereafter in absolute alcohol.

The oxidized aluminium consisted of an extremely finely divided black powder of which about 80 per cent was aluminium oxide surrounding cores of metallic aluminium.

Preparation of the colloidal aluminium hydroxide was a slightly more complicated procedure and involved the steps recently outlined by Dworski. Furnished by the Aluminium Company of America as experimental product H<sub>1010</sub>, the precipitated aluminium hydrate consisted principally of amorphous aluminium hydrate with a small quantity of x-monohydrate.

For this study, 45 female New Zealand giant albino rabbits were used. As the optimum period for inquiries into the histotoxic action of the quartz dust appeared to be six weeks the method had the advantage of speed, since, except for acute toxicity data, reliable clues are generally not obtainable by means of intravenous injection experiments in less than six months, or in less than 12 months with inhalation studies.

According to Dr. Schepers the method proved very suited to this type of inquiry. Not only was there remarkable uniformity of the results obtained in individual animals, but the range of responses correlated well with dosage ratios and further proved comparable with data gathered through the more laborious and very expensive inhalation studies pioneered by Gardner and associates. The latter feature suggests that this method may be effectively and economically substituted for inhalation experiments, particularly in evaluating the merits of new therapeutic or prophylactic agents.

#### Results of Studies

In this paper Dr. Schepers gave the results of the studies in great detail covering the range of local cytologic response. Whereas 0.1 mg. induced a typical granuloma, the local implantation of 0.01 mg. of quartz did not evoke any cytologic response, thereby introducing the concept of a pathogenic threshold for quartz particles, only beyond which all exposures are harmful, of between 0.01 and 0.1 in subcutaneous areolar tissue for 1-3 $\mu$  particles. There may also be a comparable threshold dose for the lung.

Since prophylaxis with aluminium has no value in subliminal exposures there would be no need for such if silica dust concentration could be effectively reduced below acceptable levels. Unfortunately, the concentration of inhaled quartz dust which would cause irreversible pulmonary damage was not yet known. Appreciably lower dust levels than five million particles per cubic foot must be maintained or the use of aluminium as a prophylactic agent should be considered.

The studies demonstrated that not all aluminium compounds were inert. While some had powerful protective action against the effect of quartz particles, others might actually augment the silicotic response. In practical terms, the prophylactic use of only the inert, efficacious aluminium compounds was indicated and exposure to intrinsically or potentially harmful aluminium agents avoided. The studies undertaken by Dr. Schepers demonstrated the intrinsic inertness of metallic particulate aluminium, oxidized aluminium and colloidal aluminium hydroxide. Precipitated aluminium hydrate was moderately injurious to subcutaneous tissue.

The reaction to 1 mg. to 5 mg. doses of silicon dioxide was neutralized to a variably successful degree by colloidal aluminium hydroxide, oxidized aluminium and metallic aluminium in descending order of efficiency. The antidotal effect of colloidal aluminium hydroxide was demonstrable even in a ratio of 1:500.

Precipitated hydrated aluminium exerted no protective influence against the action of the quartz particles; on the contrary, it augmented the cytotoxic and fibrogenic potency of the silicon dioxide.



## Machinery and Equipment

## Aluminium-Body Dump Truck Trials

Following an exhaustive series of tests by the Aluminium Co. of Canada in order to prove the design before it went into regular service, Canada's first aluminium heavy-duty truck body is undergoing rigorous trials at the Canadian Johns-Manville Co.'s Jeffrey Mine at Asbestos, Quebec, Canada. First reports indicate that the aluminium body will be able to take the same treatment as steel bodies while providing the operator with economies in haulage costs, and the tests on the rock body, which was made for Canadian Johns-Manville by Argon Electric Welding Co. Ltd., Lachine, P.Q., are expected to prove its design by simulating the severe service conditions this type of equipment must undergo.

It is reported that the use of 7,500 lb. of aluminium plate in the new rock body achieves a net saving in the dead-weight of the unit of 7,500 lb. and allows capacity to be increased from 14.8 to 19.2 cu. yds. Thus, for every pound of aluminium used a saving of one pound of useless load is achieved. The design of the unit, which was a joint effort of the builders and the operators working with sales development engineers of the Aluminum Co. of Canada, achieves complete integration with aluminium replacing the usual combination of heavy-gauge steel plate and wood cushions. The natural elasticity of the light metal is used to cushion the effect of the tremendous impacts encountered in this kind of service.

During the preliminary tests undertaken by Alcan, strain gauges were attached to areas of critical stress and a series of rocks weighing up to 6 tons were dropped into the body from heights ranging up to 8 ft. The durability of the side construction was proved by hanging a 6 cu. yd. shovel against it. This type of testing with strain gauges was par-

ticularly useful since it showed up areas of over-design as well as those of under-design, with the possibility of even greater weight saving in subsequent units.

Alcan foresees bright prospects for the future use of this type of body since a reduction of the order of 50 per cent in deadweight could result in vast savings in large earth-moving projects where the investment in machinery and equipment depends on the estimated loads calculated for each vehicle trip.

## A DRILL STEEL GRINDER

The new, small Atlas Copco Beaver drill steel grinder operates close to the working face and is easily moved to any vicinity where it is most needed. Drill steels may thus be re-ground on the spot. The necessity for transporting them to and from a central grinding station is thus obviated with a consequent saving of both time and money.

It is reported that the Beaver can be mounted in many different ways and is easily adapted to local working conditions. The grinder can be firmly supported by clamping it with wing nuts on to four ordinary drill steels. The machine can also be bolted to a bench or trolley or directly attached to the wall by a rock bolt.

The grinder is both simple and rugged in construction so that it will give excellent results even in the hands of an untrained operator. It can accommodate  $\frac{1}{2}$  in.,  $\frac{3}{4}$  in., and 1 in. drill steels without any adjustment and can also be very quickly adapted for gauge grinding.

The grinding wheel, motor and feed device are mounted on a swivelling arm which is swung back and forth by the operator while grinding. This arm is

hinged on long-life nylon bearings which require no lubrication. The drill steel itself is held fast in position by a pneumatic clamping device. To prevent overheating, the feed pressure is spring cushioned and in addition, the bit and grinding wheel are water cooled. This water also serves to bind the grinding dust.

## MINE WINDERS FOR SOUTH AFRICA

Two 5,200-h.p. a.c. winders, the largest of their kind, are to be supplied by Associated Electrical Industries (Heavy Plant Division) to two South African mining companies. One is for the Stilfontein G.M. Co.'s Scott Shaft and the other for the Western Reefs No. 4 Shaft of the Anglo American Corporation. Both winders have the A.E.I. system of dynamic braking, in which the field of a rotary exciter is controlled by a transducer. Each of the installations consists of a twin-motor drive controlled by a liquid resistance.

The orders were placed with A.E.I. Exports Ltd., Vickers-Armstrongs (Engineers) Ltd., designed the mechanical part of each winder, which will consist of a drum 16 ft. in dia., with two compartments, both clutched. Each compartment will be 6 ft. wide and will accommodate four layers of rope. The Vanderbijl Engineering Corp. is to manufacture this part of the equipment.

In the Scott Shaft of the Stilfontein Co., the two cages will be suitable for either men or materials. The depth of the shaft is 6,500 ft., and the winding rate 3,000 ft. per min. Each cage will accommodate 88 men.

## NEW DIESEL HYDRAULIC LOCO

The first Hunslet standard 204 h.p. diesel locomotive with mechanical transmission was supplied in 1944 to Sir Robert McAlpine and Sons Ltd., for duty on constructional work. It has since proved to be one of the most successful shunting and general purpose locomotives available, such that production now totals 156 units employed on a wide variety of duties both at home and abroad. Based on this locomotive, the Hunslet Engine Co. Ltd. has introduced a newly developed model incorporating hydraulic transmission.

This new locomotive is of 0-6-0 type with a weight in working order of 30 tons. It is powered by a Gardner type 8L3 diesel engine and Hunslet patent hydraulic transmission has been adopted in place of the four speed mechanical gearbox previously employed. By this means a starting tractive effort of 20,700 lb. is achieved with an attractive performance through two speed ranges up to a maximum of 12 m.p.h.

The new aluminium heavy-duty truck which is undergoing rigorous trials at Canadian Johns-Manville's Jeffrey Mine





At right, alongside, is the new 204 h.p. diesel hydraulic locomotive by Hunslet. At right, below, the No. 3 Shaft winder room, North Broken Hill, showing the 3,000 h.p. skip and cage winders with Ward-Leonard control

### ELECTRIC WINDERS FOR AUSTRALIA

North Broken Hill Mine, New South Wales, is in the process of commissioning a new shaft equipped with A.E.I. winders. When the shaft is finished the winders will be raising men and minerals from a depth of nearly a mile.

In the new No. 3 shaft, which at present is rather more than 4,000 ft. deep, the main cage and skip winder are each driven by twin d.c. motors having a combined rating of 3,000 h.p.; and a small cage winder is driven by an a.c. motor rated at 500 h.p., 460 r.p.m. The motor speeds of the main cage and skip winders are 53.8 r.p.m. and 64 r.p.m. respectively. With this drive, the skip winder raises 7 tons of ore at a rope speed of 49 ft. per sec.—an hourly output of 224 tons. The cage winder's human load is 3½ tons, and a complete wind takes 143.7 secs. The 500-h.p. motor raises or lowers a load of 1½ tons at a rope speed of 20.8 ft. per sec.

Identical Ward-Leonard motor-generator sets supply the twin d.c. motors on each large winder, which is also fitted with a brake governor and a servo-operated Ward-Leonard controller. These M.G. sets are equipped with hydraulic slip regulators and have 35-ton flywheels. Each winder may be supplied from either motor-generator set. The ore winder, which operates two skips in balance, has automatic control, but the cage winder for men and materials has manual control only.

All the electrical equipment for the winders was supplied by the Manchester factory of Associated Electrical Industries' Heavy Plant Division.

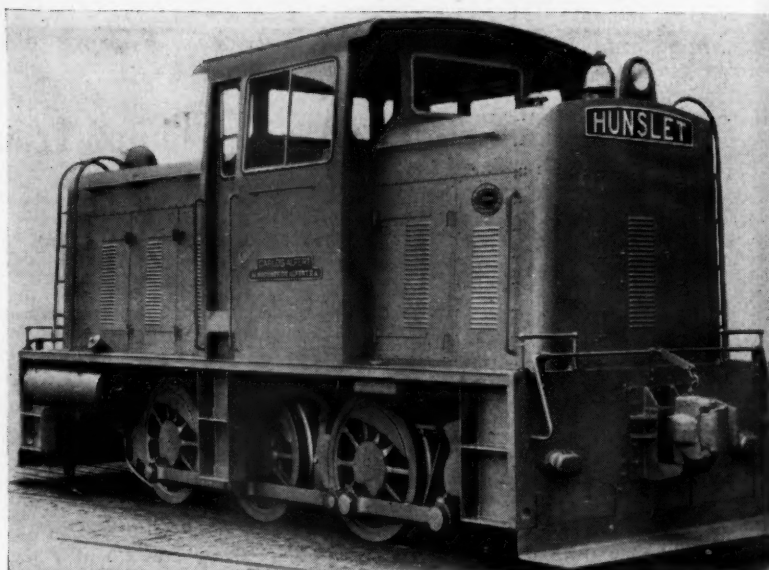
### Equipment Digest

One of the world's largest power shovels is now under construction by Marion Power Shovel Co., a division of Universal Marion Corp., United States. It was revealed in the corporation's annual report to stockholders that the giant machine, a type 5761 stripping shovel, will have a 65-cu. yd. dipper on a 165-ft. boom, and will have a working weight of more than 6,500,000 lb.

It is reported further that considerable design work has also been done on a still larger stripping shovel, for which the company hopes to have a firm order shortly.

A proposal to construct a multi-million dollar conveyor belt system in Cleveland to carry iron ore from lake-front docks to three inland steel mills is again under study. The Pennsylvania Railroad Co. has proposed use of its lakefront and ore unloading facilities at Whiskey Island and its right-of-way through the industrial river valley for construction of the conveyor belt system.

The proposed system would speed up turn-around time for the huge lake freighters delivering iron ore and limestone to Cleveland by eliminating a trip up and down the heavily congested Cuyahoga River.



### Important Licence Agreement

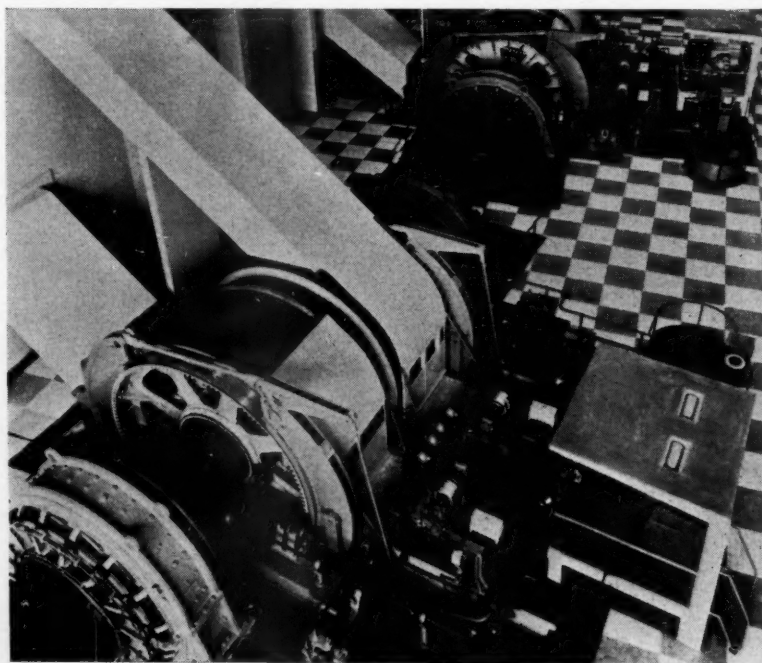
An eight-year contract for the manufacture under licence in Japan of Dowty hydraulic roof-support equipment for coal mines has been granted by Dowty Mining Equipment Ltd., to Nihon Koki Kabushiki Kaisha (Japanese Mining Equipment Co. Ltd.), of Tokyo. The terms of the agreement give N.K.K.K. selling rights for Dowty mining equipment in Japan and 11 other Far East countries.

Japanese engineers from N.K.K.K. are now visiting Dowty Mining's factory at Ashchurch, Gloucestershire, to study production methods.

Geological conditions in Japan, and consequently methods of coal extraction, are somewhat similar to those in this country. Approximately 60 per cent of the total annual output of about

55,000,000 tons is won from longwall faces on which hydraulic supports could be used; but the majority are still supported with wooden or steel props. Increased use of the coal cutter and the plough must lead to the introduction of modern roof-control methods, and Japanese mining engineers are favouring hydraulic roof-support systems.

Japan must import over half the coal required to feed her iron and steel and shipbuilding industries, and is therefore closely interested in the efficiency of other coal-producing countries in the Far East. Under the new arrangement, Dowty hydraulic roof-support equipment—the most advanced of its kind in the world—will be more readily available to these countries, most of which are under-developed industrially.



## Metals and Minerals

## Nickel In Ample Supply

The nickel picture, as presented in London last week by Dr. John F. Thompson, chairman of International Nickel, during his annual visit to Britain and the Continent, is one of rising consumption, with adequate supplies for both military and civilian requirements assured for future years.

Inco themselves are currently producing at full capacity and the Thompson Mine in Manitoba is being completed according to schedule. It is anticipated that sample operation will start in April, 1960, and production will be under way by the end of the year, rising to the planned capacity of 37,500 s.tons in 1961. Freeport Sulphur's Texas refinery is now ready and should be in a position to start producing nickel within six weeks after receiving semi-processed material from the company's mine in Cuba. It is expected that production from this source will probably become available early in 1960. Dr. Thompson considers it improbable that the U.S. Government's offer of its Nicaro plant for sale will result in a shutdown of that operation, since no commercial interests would be likely to purchase it except as a nickel-producing undertaking. He expressed the opinion that if no satisfactory bids were forthcoming, the U.S. Government would probably allow it to remain in operation in order to preserve its marketability.

Free World nickel capacity, currently placed at 275,000 s.tons, should rise to 300,000 s.tons in 1960 and to 325,000 s.tons in 1961, by which time Inco's own share of the total production will be in the region of 190,000-195,000 s.tons.

Dr. Thompson considers that world nickel consumption ought to rise by 50 per cent in the next few years, partly as a result of the widening demand for stainless steel for a wide range of domestic and industrial uses, partly due to the trend towards thicker nickel plating in existing applications, and—looking further ahead—to rising demand for nickel in the field of nuclear power and for jet and gas turbine engines as their use expands. Meanwhile, vigorous development work is in progress to overcome the backlog caused by past years of shortage.

Demand is now regarded as very satisfactory, despite some inevitable loss of production due to the steel strike in the U.S. Consumption is still some way short of current output, but the balance is being taken up by optional deliveries to the U.S. Government under existing contracts. Inco itself recently agreed to release the government from its obligation to purchase nickel for the U.S. stockpile, but some of the other producers still have contracts outstanding. To the extent that new deliveries have not actually been impounded in the

stockpile, these stocks could be regarded as overhanging the market, but in view of the high cost of much of this metal, which would show up as a government trading loss, Washington is scarcely likely to dispose of it, except in the highly improbable event of supplies suddenly becoming extremely tight.

Inco's readiness to cancel all remaining deliveries of material destined for the stockpile is in line with the industry's stated aim of maintaining a production surplus over consumption in order to ensure continuity of supply.

So far as the longer term future is concerned, the Manitoba deposit is a very large one and production could be raised to whatever levels might be justified by future demand. At least a century of production is foreseen. Nevertheless, Inco continues to press forward with its policy of world-wide exploration, in accordance with its declared objective of providing an abundance of nickel for all coming needs.

## SEVEN ORES REMOVED FROM BARTER LIST

The Agriculture Department at Washington has removed seven ore minerals from the list of barter materials it will accept from abroad in exchange for U.S. farm surpluses. These minerals are no longer eligible for barter deals because Federal stockpile quotas have been filled. Quotas for some of the 16 remaining minerals on the barter list are also reported to be nearly exhausted.

Materials now removed from the list include aluminium oxide abrasives, Surinam bauxite, chemical-grade chromite, cryolite, quicksilver, metallurgical manganese ore, and palladium. The department will continue to consider barter contracts involving antimony, bauxite (Jamaican refractory), hand-cobbed beryl, bismuth refractory chromite, columbite, metallurgical fluorspar, mica (Muscovite block, film and splittings), nickel, silicon carbide, tantalite, tin and zinc.

New barter contracts valued at \$62,500,000 were approved in the three months ended June 30, 1959. This brought the total value of contracts signed in the full 1959 fiscal year to \$158,100,000, which compares with \$65,100,000 in the previous fiscal year.

## U.S. USES MORE MERCURY

In the United States mercury consumption in the second quarter of 1959 rose by more than 50 per cent to 18,300 flasks—the highest quarterly rate in four years, according to the Bureau of Mines, U.S. Department of the Interior. Installation of a chlorine and caustic soda plant using mercury cells and large quantities of mercury for electrical apparatus and pharmaceuticals were major contributors to the increase in consumption.

The domestic supply of mercury also exceeded that of the preceding quarter, mine production rising from 7,870 to 8,080 flasks and general imports from 7,818 to 9,841 flasks. Except for the fourth quarter of 1958, which included 10,000 flasks received through barter, imports were the largest since the third quarter of 1957.

A harder tone is discernible in the London quicksilver market and most

## LONDON METAL AND ORE PRICES, OCT. 22, 1959

## METAL PRICES

Aluminium, 99.5%, £180 per ton

Antimony—

English (99%) delivered, 10 cwt. and over £190

per ton

Crude (70%) £190 per ton

Arsenic, £400 per ton

Bismuth (min. 1 ton lots) 16s. lb. nom.

Cadmium 9s. 0d. lb.

Cerium (99%) net, £16 0s. lb. delivered U.K.

Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.

Cobalt, 14s. lb.

Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram

Gold, 249s. 111d.

Iridium, £23/£25 oz. nom.

Lanthanum (98/99%) 15s. per gram.

Manganese Metal (96% - 98%) £245/£250

Magnesium, 2s. 3d. lb.

Nickel, 99.5% (home trade) £600 per ton

Osmium, £21/£23 oz. nom.

Osmiridium, nom.

Palladium, £6 10s./£7 10s.

Platinum U.K. and Empire Refined £28 10s. oz.

Imported £264/£274

Quicksilver, £72 ex-warehouse

Rhodium, £41/£45 oz.

Ruthenium, £18/£20 oz. nom.

Selenium, 50s. 0d. per lb.

Silver, 80½d. f. oz. spot and 79½d. f'd

Tellurium, 18s. lb.

## ORES AND OXIDES

Antimony Ore (60%) basis .. .. .

Beryl (min. 10 per cent BeO) .. .. .

Bismuth .. .. .

Chromite Ore—

Rhodesian Metallurgical (semifriable) 48% (Ratio 3:1) .. .. .

Hard Lump 45% (Ratio 3:1) .. .. .

Refractory 40% .. .. .

Smalls 44% (Ratio 3:1) .. .. .

Baluchistan 48% (Ratio 3:1) .. .. .

Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10:1) .. .. .

Fluorspar—

Acid Grade, Flotated Material .. .. .

Metallurgical (75/80% CaF<sub>2</sub>) .. .. .

Lithium Ore—

Petalite min. 3½% Li<sub>2</sub>O .. .. .

Lepidolite min. 3½% Li<sub>2</sub>O .. .. .

Amblygonite basis 7½% Li<sub>2</sub>O .. .. .

Magnetite, ground calcined .. .. .

Magnetite Raw (ground) .. .. .

Manganese Ore Indian—

Europe (46% - 48%) basis 65s. 0d. freight .. .. .

Manganese Ore (43% - 45%) .. .. .

Manganese Ore (38% - 40%) .. .. .

Molybdenite (85%) basis .. .. .

Titanium Ore—

Rutile 95/97% TiO<sub>2</sub> (prompt delivery) .. .. .

Ilmenite 52/54% TiO<sub>2</sub> .. .. .

Wolfram and Scheelite (65%) .. .. .

Vanadium—

Fused oxide 95% V<sub>2</sub>O<sub>5</sub> .. .. .

Zircon Sand (Australian) 65 - 66% ZrO<sub>2</sub> .. .. .

19s. 6d./20s. 6d. per unit, c.i.f.

225s./235s. per l. ton unit BeO

30% 5s. 0d. lb. c.i.f.

20% 3s. 3d. lb. c.i.f.

£15 15s. 0d. per ton c.i.f.

£15 10s. 0d. per ton c.i.f.

£11 0s. 0d. per ton c.i.f.

£14 0s. 0d. per ton c.i.f.

£11 15s. 0d. per ton f.o.b.

Nb<sub>2</sub>O<sub>5</sub>:Ta<sub>2</sub>O<sub>5</sub> 165s./170s. per l. ton unit c.i.f.

£22 13s. 3d. per ton ex. works

156s. 0d. ex works

40s. 0d./45s. 0d. per unit f.o.b. Beira

40s. 0d./45s. 0d. per unit f.o.b. Beira

£25 0s. per ton f.o.b. Beira

£28 0s./£30 0s. d/d

£21 0s./£23 0s. d/d

72d./74d. c.i.f. nom.

68d./70d. c.i.f. nom.

nom.

8s. 11d. per lb (f.o.b.)

£29 per ton c.i.f. Aust'n.

£11 10s. per ton c.i.f. Malayan

125s. 0d./130s. 6d. per unit c.i.f.

8s./8s. 11d. per lb. V<sub>2</sub>O<sub>5</sub> c.i.f.

£16/£16 10s. ton c.i.f.



dealers now quote £72 per flask for ex-warehouse London metal compared with £71 10s.-£72 recently. In one or two instances slightly higher prices have been mentioned. There is reported to be not quite so much spot metal about, while the possibility of the U.S. taking more Mexican material because of the uncertain east coast dock labour situation in that country cannot be ruled out. This could be expected to result in some reduction in the quantity of Mexican metal available for Europe.

\*

After a long interval Turkey has again exported some quicksilver. A consignment worth £170,000 was shipped to the U.S., while 6.5 tons worth some £100,000 were exported to the Netherlands.

#### BRITISH ALLOYS LICENSED TO U.S. FIRM

A patents licence covering "exotic" metal alloys developed for use in missiles, rockets and high-performance aircraft and similar high-temperature lightweight applications has been acquired by Bendix Aviation Corporation, of New Jersey, from Magnesium

Elektron, of Manchester. It grants Bendix the right to manufacture, use and sell in the U.S. castings produced by Magnesium Elektron's techniques or "by means of or utilizing any of the inventions covered by the British firm's patents". The Elektron alloys cover the zirconium, rare earths and thorium series, as well as a new high-strength magnesium alloy.

#### QUIET CHROMITE MARKET

There has been no great change in the general pattern of the chrome ore market. Although buying interest for 1960 has increased, this has so far not had any effect on prices, which remain at their depressed level. The lack of any worthwhile demand from the United States because of the crippling steel strike in that country has been a dampening influence in the market.

Turkish shipment prices continue to be very competitive. Turkish 48 per cent material, 3:1 ratio, is nominally indicated at \$34.50 to \$35.50 per ton c.i.f. Russia also is believed to have ore to sell at keen prices especially to Japan and certain Continental countries.

### COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

The past week has been one of the most interesting on 'change for a long time, and in active trading a good tone has prevailed throughout the market with particular emphasis on the rise in copper and zinc values.

#### COPPER REACTS UPWARDS

The copper market, after some weeks of marking time, has undergone a sharp change during the week, since both dealers and consumers started to take an active interest only to find available supplies were restricted. Although it is true that the U.S. has been a buyer of copper recently, Continental interest has not been enthusiastic. This has been reflected in the day-to-day quotations on the London Metal Exchange, but it was becoming increasingly clear that the time could not be far off when buyers would be compelled to enter the market and that when this moment arrived, values would react swiftly in an upward direction.

It must be remembered that the U.S. strike is now two months old and the loss of metal estimated at some 165,000 tons which, at the average rate of deliveries for the first nine months of the year, is equal to approximately a month and a half of consumption. There is no reason to consider a settlement any nearer now than it has been during the whole course of the strike, and latest impressions from Chile indicate a worsening in the situation in that country. Until this week, at any rate, it can be said that the market has given

little recognition, so far as values are concerned, of this substantial loss of metal.

The London quotations for both nearby and forward metal have moved higher and the shortage in nearby supplies—U.K. official warehouse stocks declined further 1,104 tons to 10,443 tons—has resulted in a widening in the backwardation. The Belgian copper price has been increased in the period under review to 29.25 c. New York/Antwerp, duty for buyers' account.

In the U.S. consumer interest has centred on copper for delivery before the end of the year with 36½ c. paid for "spot" material. The scrap market has moved higher to 25½ c., basis No. 2 wire, equivalent to a refined price of 30½ c. Negotiations between the companies and the Union continue on a day-to-day basis. Kennecott has suspended talks until the beginning of next week, whilst Anaconda's recent offer was quickly rejected by the Union.

The U.S. and world copper figures were published at the end of last week and no doubt a weekend's reflection on these has been a major cause behind the improvement in demand. The U.S. mine and refined production fell to the lowest level since the 1930's, whilst stocks were at the lowest since June, 1956. The figures appear below.

#### TIN LITTLE CHANGED

Tin has been a relatively quiet market and values have shown little change. U.S. buying remains quiet in view of the

steel strike but with resumption of production likely in the near future, demand from that quarter should improve. Continental demand continues satisfactory and the softer tendency in the forward quotation in London at the end of last week probably reflected sales against Eastern purchases. U.K. stocks declined substantially last week by some 537 tons to 7,660 tons. Tin shipments from Singapore during the first half of October amounted to 5½ tons compared with 4½ tons in the first half of September, whilst comparative figures from Penang were 2,138½ tons compared with 1,470½ tons.

On Thursday the Eastern price was equivalent to £808½ per ton c.i.f. Europe.

#### LEAD-ZINC MARGIN WIDENS FURTHER

The firmness in zinc has been, perhaps, the main topic of interest and although lead values have also improved a span of nearly £25 between the two quotations has been established.

In the case of zinc, the general picture is one of brisk demand in the U.K., with consumption running at a higher level than last year, and overseas, whilst the shortage of nearby material is evidenced by the establishment of a substantial backwardation. The Canadian zinc price has been increased twice during the week and is now quoted 12½ c. f.o.b. Montreal/Toronto. Finally, on Wednesday, the price of U.S. zinc, East. St. Louis, moved up 1c. and is now quoted at 13 c. Demand for high-grade, particularly from the motor industry, is good but lead demand continues slow although the undertone of the market is very satisfactory.

U.S. production of lead in August was 21,700 tons or 11 per cent higher than July, whilst zinc production at 31,000 tons was practically the same as for the previous month owing to labour strikes in certain quarters.

#### LATEST U.K. STATISTICS

Figures published during the week in respect of the U.K. show that the August consumption of copper totalled 40,621 tons compared with 47,252 tons in July. Comparative figures for the same months in the case of the other metals were:—

Tin—1,224 tons against 1,682 tons.  
Lead—23,358 tons against 26,851 tons.  
Zinc—21,566 tons against 26,108 tons.

Closing prices are as follows:

	Oct. 15		Oct. 22	
	Buyers	Sellers	Buyers	Sellers
<b>COPPER</b>				
Cash .. ..	£234½	£234½	£249	£250
Three months ..	£234	£234½	£240½	£241
Settlement ..	£234½		£250	
Week's turnover	14,000 tons		18,175 tons	
<b>LEAD</b>				
Current ½ month ..	£69½	£69½	£71½	£71½
Three months ..	£71½	£71½	£72½	£72½
Week's turnover	6,625 tons		9,550 tons	
<b>TIN</b>				
Cash .. ..	£793½	£794	£794	£794½
Three months ..	£793	£793½	£794	£794½
Settlement ..	£794		£794½	
Week's turnover	795 tons		495 tons	
<b>ZINC</b>				
Current ½ month ..	£90½	£91	£96½	£97
Three months ..	£88	£88½	£92½	£93
Week's turnover	5,875 tons		9,400 tons	

	U.S.		World	
	September	August	September	August
Refined production .. ..	28,847	81,176	142,646	142,276
Domestic deliveries .. ..	92,501	90,123	139,781	147,821
Stocks .. ..	61,524	91,608	275,100	284,540



# MINING MISCELLANY

Scientists and coal experts on Australia's new coal resources advisory committee started an enquiry in Sydney on September 11 into ways of revitalizing the flagging use of coal in Australia. Senator Spooner, Minister for National Development, said that last year diesel trains in Australia had used fuel oil equivalent to nearly 1,000,000 tons of coal and further inroads could be expected. Both for gas production and general industry, coal had lost ground, and if this trend continued, one of Australia's greatest national resources would be relegated to a relatively minor position. Australia would become increasingly dependent on imported oil and in the absence of a commercial oil discovery this was undesirable.

The enormous interest shown by American mine operators in Dowty equipment, following that company's participation, as the only British exhibitor, in the Cleveland Coal Show in May last, has led to the re-organization of Dowty Mining Ltd. of Ajax, Ontario. Mr. R. F. Hunt, deputy chairman of the Dowty Group, stated that first deliveries to the U.S. of the new Dowty Rodjo Shield, specially designed for American short-walled methods, will take place in the next few weeks, while they expect to have two complete longwall faces equipped with the Dowty Roofmaster self-advancing hydraulic roof-support system working early in 1960. Sir George Dowty, Chairman of the Dowty Group, is at present visiting the U.S., and will be devoting much of his stay to furthering developments in the mining field.

It is reported from Bangkok that the Thai Ministry of Industry and the Council of Ministers are prepared to approve an application of the Narubest Co., to take over the gold mines of the Mines Department in Prachinburi Province. The mines have been closed for two years, but in re-opening them the company has offered to repay the Mines Department's investment by payments of 5 per cent of the gross value of the gold produced plus a rent of 5 per cent of the first 100 kg., and 3 per cent of each additional kg. produced.

Following the Pakistan Government's decision to provide attractive terms for investors in Pakistan comes the announcement of the appointment of a company law commission to examine the existing Act and suggest modifications to safeguard the interests of investors.

A team of French experts is expected to arrive in Pakistan towards the end of 1959 to assist Government of Pakistan geologists in the search for radio-active minerals in West Pakistan.

Iron ore showed the most significant increase of all mineral production in Chile in 1958, and is expected to develop still further. Output of iron ore totalled 3,758,815 tonnes in 1958, compared with 3,081,300 tonnes in 1957. Two "medium" mining companies, Cia. Minera Santa Fe and Cia. Minera Santa Barbara accounted for most of the increased output. Exports also increased from 3,053,377 tonnes in 1957 to 3,467,181 tonnes in 1958.

Mr. Holger Fangel, managing director of the affiliated Bleikvassli Gruber and Mofjellet Gruber, has announced that this

Norwegian mining concern has sold in advance its scheduled 1960 output of zinc, lead and copper concentrates to Western Germany. Production next year is expected to reach between 12,000 and 15,000 tonnes of zinc concentrate, 4,000 to 5,000 tonnes of lead concentrate and some 1,000 tonnes of copper concentrate. The affiliated companies also produce sulphur pyrite as a by-product, but demand has remained weak, and plans are now being considered for building a sulphuric acid plant, with an annual output capacity of about 40,000 tonnes to provide an outlet for this product.

The Glidden Co., has acquired what is reported to be a large deposit of high-grade ilmenite ore in Ocean County, New Jersey, U.S. from American Metal Climax Inc. The deposit represents a 20-year supply of high-grade domestic ore at the company's chemicals-pigments-metals division's current level of operations, while additional adjacent acreage is under option. Mr. Halsey, vice-president and general manager of the Division stated that Glidden will operate a mine at the site to supply a substantial portion of its ilmenite ore needs, the balance of requirements for its large pigment plant at Baltimore to be purchased in world markets from present suppliers. A concentrating and separating plant to be built on the property will be completed by the end of 1961.

The Norwegian Geological Survey is investigating a newly discovered copper ore body to the south-east of Storvatn, about six miles off the highway between Alta and Kautokeino in Finnmark. The orebody is being explored by geophysical prospecting and diamond drilling.

Cupreous pyrite ore is being investigated by diamond drilling at Andfiskvann near Mo i Rana in Northern Norway. Ore of good quality has already been encountered in some places.

Already Perak has surpassed Johore as an iron producer and is challenging Kelantan as Malaya's second largest producing state. Trengganu, Malaya's biggest iron-ore producer, has an annual output of over 2,000,000 tons. Recent investigations have proved iron ore deposits in the Ipoh district of over 10,000,000 tons and Perak's output is expected to be over 1,000,000 tons in 1960. Last year's output of iron ore was 285,818 tons, but production increased to 196,808 tons in the first six months of 1959. The total Malayan output of iron ore for 1959 is expected to double the 2,800,000 tons produced in 1958. The industry is entirely dependent on Japanese contracts.

According to a statement made recently in Cairo by Amin Helmi Kamil, managing-director of the Five-Year Industrial Programme Authority of the United Arab Republic, agreement has now been reached between the governments of the United Arab Republic and the Soviet Union, whereunder the latter will give help in the building of industrial projects in the Southern region of the U.A.R. These projects include a coke plant, an iron ore concentration plant at Aswan, aluminium and zinc plants, and a lubricating oil plant at Suez.

A Secondary Technical School for Mining has recently been opened at the

Hongay mines in the Republic of North Viet Nam.

A new company, Siderurgia Sarda, with a capital of 300,000,000 lire, has been formed for the exploitation of iron ore, with its seat at Cagliari, on the Italian island of Sardinia. The company is to exploit the iron ore deposits at Aritzo and Gadoni in the province of Nuoro, and it is intended to open an iron and steel works later, utilizing this ore.

Experts from the Danish Atomic Energy Commission have visited East Greenland to investigate the possibility of erecting an atomic power station near Mestersvig. The power will be used in the mining of molybdenum.

The Finnish Government are understood to have bought a controlling interest in the mineral prospecting company, Suomen Malmi Oy., in which they already own 30 per cent of the shares. An iron mine is to be opened by Otanmaki Oy. at Misiraaka in Lapland.

Based on Birmingham and occupying new premises, the Midlands Branch of Holman Brothers Ltd. will have a large selling and servicing organisation and will deal with all group products, i.e. the products of the parent company, Holman Brothers Ltd. as well as of the subsidiary companies, Climax Rock Drill & Engineering Ltd., Maxam Power Ltd., Goodyear Pumps Ltd. and Dustuctor Co. Ltd. The Branch is accommodated in a new building at Lightning Way, Alvechurch Road, West Heath, Birmingham 31, which was opened on Tuesday. The premises comprise an office block with an area of 1,220 sq. ft. and stores servicing and workshop areas extending over 2,800 sq. ft. The design of the new building allows for the addition of a second storey to the office block and the expansion of the stores and works area by over 4,000 sq. ft. To mark this opening an exhibition is being staged at the Branch from Tuesday of this week until today. A comprehensive range of Group products is on display in the new premises and in three large exhibition vans.

Eldorado Mining and Refining Ltd., the Canadian Government company which has so far confined its activities to producing uranium, or acting as sales agent between other Canadian uranium producers and the U.S. Government, has staked more than 1,000 claims along a 70-mile north-south stretch between the 65th and 66th parallels north of Wopmay Lake, 50 miles east of the south end of Great Bear Lake. The ground has been staked as the result of airborne electromagnetic and geophysical surveys conducted during the last few months by helicopter.

The Rhodesia and Nyasaland Club gave a dinner on October 20 at the Savoy Hotel, London, in honour of Mr. and Mrs. H. F. Oppenheimer. Lord Malvern presided.

Mr. Robert Menzies, Prime Minister of Australia, announced in the House of Representatives that the Federal Government will not lift the embargo on the export of iron ore from Australia. It believed iron ore and steel were so basically important to the Australian economy that Australia's limited known reserves should be conserved.

This statement follows a request by the West Australian Government for permission to export iron ore.

### PERSONAL

Mr. Michael C. Potts and Mr. Peter Sharp have been appointed directors of Dowty Mining Ltd., of Ajax, Ontario, a member of the Dowty Group of Cheltenham. Mr. Sharp has also been appointed general manager.

Fred Myers, Ltd., the Caterpillar dealer for London and the home counties, have announced that Mr. P. E. Fleming has relinquished the position of sales director and has accepted the appointment of director responsible for all agricultural activities of the company. Mr. D. R. Bowers, sales manager of Caterpillar Industrial Sales Division, and Mr. A. F. Stevenson, sales manager of the Hyster Handling Equipment Division, will each assume full responsibility for sales of Caterpillar earthmoving equipment and Hyster handling equipment respectively from Fred Myers sales office at 24 Bruton Street, London, W.1.

Mr. M. J. S. Clapham, joint managing director of Imperial Chemical Industries metals division has been appointed chairman of that division from January 1. He will succeed Dr. M. Cook, who retires from the company's service at the end of the year.

Mr. Lloyd A. Amos has been appointed manager of operations for Kaiser Aluminium International.

Mr. C. Thomson, A.M.I.Mech.E. has been appointed Sales Manager of the Conveyor Belting Division of The North British Rubber Co. Ltd.

Mr. Michael George Cohen is to take up residence immediately in the U.S. as a vice-president of George Cohen 600 Inc., of New York, the American Company of the British concern, George Cohen Sons & Co., Ltd.

### COURSES IN IRON ORE QUARRYING AND MINING

When the City and Guilds of London Institute was approached initially in 1957 by the National Council of Associated Iron Ore Producers, it was envisaged that, in addition to the examinations for those employed in opencast quarrying, a syllabus would be drawn up for operatives employed in underground stratified ironstone mines. Since much of the syllabus would have overlapped with that for the Iron Ore Quarry Operatives' Course, it has been decided to make minor changes in the latter. From September, 1959, the title has been changed to Iron Ore Operatives' Course. The course will now be suitable for operatives in both quarries and mines.

There is a recognized need for a qualification for those who wish to progress beyond the stage of the Iron Ore Quarrying Certificate, and regulations and a syllabus for an Iron Ore Quarrying Advanced Certificate have been drawn up. It is intended primarily for those holding positions of senior management, and that the examination will normally be taken on the completion of 1,000 hours of instruction. The examination will consist of four papers; one on quarry development and working, one on quarry plant and equipment, one on quarry legislation, and one on general subjects associated with the iron ore industry. The first examination will be offered in 1961.

## Mining Finance

### Two More Kinross Mines

The flotation of a new gold mine is still something of an event for the South Africans, but the simultaneous flotation of two mines by a finance house is something of a rarity. The achievement comes from Union Corporation, whose mine St. Helena in the Orange Free State is one of the talking points of the market. The house decided that it would not be politic to announce the results of boreholes as they came to hand, but to wait until a full picture could be presented. These suggest that the Bracken Mine probably has a smaller tonnage of ore but that its quality is better than that of Leslie, which lies to the west. Bracken appears to have the lower payability, though both mines are thought to be moderately heavily faulted. The two mines are likely to be in the medium grade class, though one cannot be sure until development has got under way, and that will not be until some time in 1961.

The mines are of almost identical size, and have the same lease formula, which is the same for Winkelhaak, which lies immediately to the east of Bracken, that is to say,

$$Y = 15 - 90$$

×

Each mine will sink a pair of shafts, the one at Leslie being intended to be sunk to a depth of 3,100 ft. and Bracken to 2,700 ft. The reduction plants will each have an initial capacity of 65,000 tons per month, and Bracken will extend its size as soon as possible after production starts, probably 3½ to 4 years hence, to 90,000 tons. Leslie, which is expected to begin milling in 4 to 4½ years, has plans to increase its scale of working to 150,000 tons. This difference in the prospective objectives will involve Leslie in heavier expenditure even in the initial stages. It is thought that the total cost of bringing Leslie to production will be £10,190,000, while that of Bracken will be £8,500,000. Leslie is estimated to need a further £2,245,000 before it can finance further capital expenditure from profits, and Bracken £1,544,000, but no plans have been made for the raising of these sums. These amounts have been calculated after including the money coming from the "rights" issue now being made, and the sale of 10s. shares at 15s. each to a number of interested parties. The "rights" issue consists of the offer to shareholders of Union Corporation to subscribe for one share at par in each of the new mines on the basis of one-for-ten, and to members of Winkelhaak also at par in the ratio of one-for-twenty-five.

The prospectus discloses that Union Corporation and its wholly-owned subsidiary, Acacia Mines, owns 81.1 per cent of the issued capital of the Leslie mine, equal to 73.6 per cent of the capital after the increase caused by the present offer. The proportions of the Bracken capital so held are 85.4 per cent and 76.4 per cent.

The geological survey and the diamond drilling have revealed that beneath between 500 and 800 ft. of Karroo beds, there exists a succession of Ventersdorp

lava, and Upper and Lower Witwatersrand Sediments. The main gold deposit is in the Kimberley reef, but no significant uranium values have been disclosed. Boreholes sunk to the Main Reef show no values of economic significance. The reef appears to sub-outcrop about 700 ft. below the surface under the Karroo system, more or less along the line of the southern boundaries of the two mines, and to dip towards the north at an angle of about 30 deg. The deepest intersection reported by the Bracken mine is No. 207 at 2,490 ft. and Leslie at borehole No. 320 went to a depth of 3,558 ft. Although the chairman at the last annual meeting referred to the possibility of a fourth mine in this area, no information has been forthcoming about that.

Shareholders in Union Corporation and Winkelhaak Mines should exercise their rights of subscription. They will probably see a substantial profit when dealings commence, but for any further improvement, they will probably have to wait for several years. In the case of Winkelhaak Mines, this extra appreciation was well worth the waiting since the 10s shares now stand at 27s.

### EXPANSION PAYS OFF AT MOUNT ISA

All those concerned with Mount Isa will be extremely pleased that the management decided some years ago to exploit copper deposits. It is not possible to separate the two sides of the business and to allocate the net profits of any one year between the copper side and the older division of silver-lead-zinc production. It is clear, however, that the improvement in the net income from £A1,498,533 to £A4,030,722 has been due in no small measure to copper. The output of blister copper rose from 31,165 tons to 41,945, and in addition for the first time the company had copper concentrates available for treatment overseas. The metal in these concentrates was equal to 9,779 tons, so that the copper output rose effectively from 31,165 to something in excess of 50,000 tons. Some of the greater availability of copper came from stepping up the quantity of ore treated from 843,562 to 1,356,163 tons and part came from the increase in the grade of copper from 3.9 per cent to 4.1. On the financial side, the price of copper improved, the quotation at the end of 1958-59 being £A285 per ton as compared with £A244 a year earlier. It is encouraging to note in passing that since last June the price of copper is higher than in the corresponding months of 1958-59.

On the silver-lead-zinc side, the company's policy of improving efficiencies resulted in a further increase in the tonnage treated, the 1958-59 figures being 922,416 tons, against 811,508 in 1957-58 and 671,465 for 1956-57.

The greater tonnages have been extracted without raiding the ore reserves; indeed, these are now higher than 12 months ago. The silver-lead-zinc reserves are up by 1,000,000 tons to



25,200,000 tons with the average grades unchanged. The copper reserves have shown an even more satisfactory expansion, rising from 16,650,000 tons to 20,100,000 tons, equal to slightly more than 15 years' supply at the 1958-59 rate.

The board has decided to recommend a final payment of 15 per cent, making with the interim of last June a total of 25 per cent. This compares with a total distribution of 12½ per cent for the whole of 1957-58. A direct comparison between these two totals would be misleading, since between them, a scrip issue of one-for-eight was made, so that the latest total is equal to 28½ per cent on the old capital. The 1958-59 dividends cost £A1,781,169 in all, leaving £A2,249,553 to be retained out of the year's profits.

**Eileen Alannah.**—The directors of Eileen Alannah have issued a statement regarding the future of the company. Its remaining assets, they say, comprise cash and securities to the value of about £24,000. In the event of liquidation the amounts payable to shareholders would be about 4½d. per ordinary share and about 1s. 8d. per share on the deferred capital. The directors are still trying to formulate a scheme whereby shareholders will be provided with a better return.

## LONDON MARKET HIGHLIGHTS

There was plenty of interest in Mining share markets during the past week to keep jobbers and brokers fully occupied. A feature was the wave of investment demand for Coppers and Lead-zincs which was attracted by rising metal prices and earnings prospects together with the relatively high yields offered on most of the shares.

Messina provided the star turn by jumping 10s. in a single day to 130s.; the shares were only 115s. 7½d. when mentioned here last week. Among other copper issues, buyers were about for Rhodesian Anglo American (93s. 1½d.) and Rhokana (£36) in anticipation of the final dividends due to be published on Friday. There were also hopes that Rhokana would make a scrip issue, or at least a share-splitting proposal. Activity revived in the shares of the young M.T.D. (Mangula) mine while the more speculative buyers raised Rhodesia-Katanga to 20s. and Bancroft to 27s. 1½d. Another minor highlight was the passing by Chartered (105s. 9d.) of the 100s. mark for the first time.

There were similar movements in Lead-zincs. New Broken Hill for example, advanced 6s. to 40s. 9d. while Consolidated Zinc moved up 5s. 9d. to 73s. 3d. The appearance of the Mount Isa report was greeted by a fresh upsurge of Australian demand, the shares rising to 54s. 3d., at which price they yield no more than 1.8 per cent. Buyers were taking note of the much higher yield available on Mount Morgan which improved to 19s.

Exceptionally, Tin shares stayed out of the picture. Fears that tin-bearing land is rapidly being exhausted seemed to upset the market. But this should have been taken as a bull point for such long life mines as Malayan (24s. 3d.).

The search for reasonable dividend

## BOARD CHANGES

Mr. F. Archdale and Mr. Will Archdale have resigned from the board of the Staveley Coal and Iron Co. They will remain on the board of its subsidiary, James Archdale and Co., for the time being.

★

Field-Marshal Sir Gerald Templer has been appointed a director, and elected chairman, of the British Metal Corporation, a subsidiary of the Amalgamated Metal Corporation. Mr. A. J. Hugh Smith has resigned as chairman on account of advancing years, but will remain on the Board. Sir Gerald is to be elected a director of Amalgamated Metal at the next meeting of the Board, in November.

★

Rear-Admiral C. C. Clark, C.B., O.B.E., D.S.C., R.A.N. (Retired), recently Third Naval Member and Chief of Construction, Australian Naval Board, has accepted an invitation to join the Board of The Broken Hill Proprietary Co. Ltd.

★

Mr. T. H. Bradford and Mr. E. J. T. Goudie have been appointed directors of Consolidated African Selection Trust. Mr. E. C. Wharton-Tigar, who has been Executive Director since 1955, has been appointed Managing Director.

## CLUTHA RIVER GOLD DREDGING

The twenty-fifth annual general meeting of Clutha River Gold Dredging, Ltd., was held on October 21, at 73 Cheap-side, E.C.2.

Mr. F. Gordon Payne, M.I.Mech.E., Chairman, presided, and the following is an extract from his Statement circulated with the Report and Accounts for the year ended March 31, 1959:—

The profit before taxation amounts to £7,109 compared with £11,736 in the previous year. The net profit after charging £2,999 for taxation for the year, amounts to £4,110 compared with £8,193 in the previous year. Although the profit is disappointingly low my colleagues and I feel that it is in the best interests of the Shareholders to pay a dividend, and to make this possible it has been decided not to provide this year for further depreciation on the plant and machinery, nor to write anything off Mining Land, nor make any transfer to General Reserve which now stands at £12,080. There is also some further justification for this course in view of the better outputs being obtained for the current year to date. A dividend of 5 per cent is therefore recommended, leaving a balance of £3,266, to be carried forward to the current year.

The average price received for our gold during the year was £12 9s. 4d. per fine ounce, compared with £12 8s. 8d. for the previous year.

With reference to operations at the Mine, the dredge worked satisfactorily, and the only abnormal stoppage was for a period of 131 hours when the dredge was out of action due to the bucket line parting. This necessitated the service of divers, and the General Manager and his Staff did extremely good work in recovering the band and getting the dredge operating again in such a short time. Stoppages for the whole year amounted to 228 hours. Great credit is due to all at the Mine for the excellent running time and yardage obtained, which resulted in a substantial reduction in working costs per cubic yard.

## Current Operations

The dredge reached Block 5 in July, and judging by the boring results this area should produce better returns than we have experienced over the last few years. The output for the current year up to September 11 amounts to 3,292 ounces, compared with 2,349 ounces for the same period in the previous year.

There is still no change in the price of gold, but there is an indication of a possible revaluation at a not too distant date, in the present inflationary tendency in the U.S.A. and the American gold losses.

There is one further matter I would like to mention before concluding my Statement. Your Directors have not overlooked the question of making another Capital Repayment. In the Shareholders' interests it is important that any Return of Capital should be made at a time when the fullest advantage can be obtained in regard to taxation relief. Returns of Capital are taxed in New Zealand in the same way as dividends paid out of profits. The whole question is under constant review, and Shareholders will be advised of the position later on in the current year.

The Report and Accounts were adopted.



## FREE STATE DEVELOPMENT AND INVESTMENT CORPORATION, LIMITED

(Incorporated in the Union of South Africa.)

REVIEW BY THE CHAIRMAN, MR. D. A. B. WATSON

(Issued with the Report and Accounts for the year ended June 30, 1959.)

The directors' report and accounts give details of the affairs of the company for the year ended June 30, 1959.

### Profits and Financial Position

The net profit for the year was £12,403, compared with £8,425 for the previous year.

At June 30, 1959, the net cash funds held by the company amounted to £138,230.

The aggregate market value of the company's quoted investments was £259,882 at June 30, 1959, compared with their book value of £1,101,372. The difference between these two figures is accounted for mainly by the decline in the market value of the company's shareholdings in Freddie's Consolidated Mines Limited.

### Western Areas Prospect

During the year under review Johannesburg Consolidated Investment Company Limited applied for a mining lease over a portion of the area covered by the Western Areas Prospect. On August 24, 1959, Johannesburg Consolidated Investment Company Limited received official notification that the mining lease would be granted to it and on September 8, 1959, a company called Western Areas Gold Mining Company Limited was incorporated for the purpose of taking cession of the lease and of all the other mineral and freehold rights held in respect of the Western Areas Prospect.

As members are aware, your company contributed approximately 20 per cent of the expenditure incurred on this Prospect and was in turn entitled to approximately 20 per cent of the net rights which might flow from such expenditure. In the case of the arrangements relating to the flotation of Western Areas Gold Mining Company Limited these net rights were determinable after taking into account certain prior rights of subscription and certain rights due to parties, such as Union Free State Mining and Finance Corporation Limited, Anglo-Rand Mining & Finance Corporation Limited and New Union Goldfields Limited, who, while they were signatories to the flotation agreement were not members of the Western Areas Prospect and acquired their rights in terms of agreements under which certain option contracts and freehold and mineral rights were obtained for the benefit of the Prospect.

By virtue of its participation rights in the Western Areas Prospect and in accordance with the provisions of the flotation agreement of Western Areas Gold Mining Company Limited, your company has, since the close of the year under review, subscribed in cash at par for 450,000 fully-paid shares of 10s. each in Western Areas Gold Mining Company Limited and for 242,328 partly-paid shares of 10s. each on which 2s. 6d. per share has at present been called and paid, and has also been refunded in

cash the amount of £199,978 which it contributed towards the expenditure incurred on the Western Areas Prospect.

In addition, your company secured for its members the right to subscribe at par for 1,452,000 shares of 10s. each in Western Areas Gold Mining Company Limited, payable in full on subscription, in the proportion of two shares in the latter company for every five shares registered in their names in the books of your company at the close of business on Friday, October 16, 1959.

This offer will close on November 20, 1959.

The total amount expended by your company in subscribing for the 450,000 fully-paid and 242,328 partly-paid shares in Western Areas Gold Mining Company Limited was £255,291, from which should be deducted the sum of £199,978 refunded by that company, making the net expenditure £55,313. The amount still to be expended by your company in meeting the calls on the partly-paid shares is £90,873. This amount is payable in two equal instalments of £45,436 10s each, which will be called not earlier than December 1, 1960, and December 1, 1961, respectively.

Neither your company nor any of the other parties to the flotation agreement has any further rights in the mining lease or in the mineral rights and freehold property which were formerly held in respect of the Western Areas Prospect and which are now to be transferred to Western Areas Gold Mining Company Limited in accordance with the provisions of that agreement.

### Prospecting Operations

Members were advised during the year that, with a view to obtaining further information regarding the area, your company had decided to drill two boreholes jointly with certain other companies on the western and eastern boundaries respectively of the block of farms immediately south of the Vaal River, over which your company holds the mineral rights. Details regarding the block of farms and the location of the boreholes are given in the directors' report and the plan accompanying it.

At September 30, 1959, Borehole G.Z.1, which is on the western boundary of the block and is being drilled jointly with Western Holdings Limited, had reached a depth of 6,567 feet and was in the Kimberley - Elsburg Series. The indications are that the Vaal Reef, if intersected in this borehole, will be some 7,500 to 8,000 feet below surface.

The other borehole, D.C.I., which is situated on the eastern boundary of the block and is being drilled jointly with Rand Mines Limited, had reached a depth of 6,260 feet at September 30, 1959, and was in Dolomite, suggesting that the Vaal Reef, if intersected, is likely to be at a considerable depth.

When the drilling of these two holes has been completed, members will be given details of the results obtained.

Apart from the foregoing, no other

prospecting operations were conducted by your company during the year.

### Conclusion

Before concluding, it is with deep regret that I have to refer to the death of Mr. I. M. Campbell Rodger, who had been a director of the company from 1955 until his death on August 2, 1959.

Finally, I would like to place on record the Board's appreciation of the excellent services rendered during the year by the technical and administrative staffs at the Head Office.

The Annual General Meeting of Members will be held in the Board Room, Consolidated Building, corner of Fox and Harrison Streets, Johannesburg, on Thursday, November 12, 1959, at 2.30 p.m.

## KWAHU MINING COMPANY

The annual general meeting of Kwahu Mining Co. (1925) Ltd., was held on October 22, at Winchester House, E.C.2.

Mr. A. Hedley Williams, M.I.M.M., M.Inst.Pet., Chairman, presided.

The following is an extract from his circulated Statement:—

The Accounts for the year to June 30, 1959, show a net profit, after all charges, of £48,047 which compares with £17,625 for the previous year. The greater part of this increase has been occasioned by the more favourable opportunities which existed during the year for profitable share dealings, of which full advantage was taken. However, the increase in dividend income from £20,693 to £32,711 is more worthy of note and derives principally from the payment by Ghana Main Reef Ltd. of dividends totalling 12½% which included a special bonus of 2½%.

The Balance Sheet reflects the healthy position of the Company, especially in that there was an appreciation over book cost of our quoted investments at June 30 of £104,000, in spite of profits realized during the year of £23,805. As will be seen from the Directors' Report, this appreciation has been maintained to date in spite of profits realized since the close of the year.

Ghana Main Reef Ltd., in the year to June 30, 1958, earned a net profit of £71,612 and has since taken steps to qualify as an Overseas Trading Corporation from April 6, 1959, so as to obtain the advantages accruing to such corporations from U.K. legislation. Development results for the year to June 30, 1959, as disclosed in the quarterly reports, have continued to be favourable.

As regards The Esperanza Copper & Sulphur Company Limited, sales of ore by the subsidiary Company have shown a definite improvement particularly during the current year which commenced on April 1 last. This has enabled the parent Company to pay interest on the debentures, which has been in arrear since 1956, and to repay temporary loans which have been made in the interim. It is also proposed shortly to restart milling operations of the Limni ore, on which a good return is expected over the next 4/6 years subject to satisfactory metal prices.

The Report and Accounts were approved together with the dividend of 30 per cent.

## Coming Events

An exhibition, sponsored by the British Chemical Plant Manufacturers' Association, will take place from April 6-9, 1960, on the occasion of the International Mineral Processing Congress, 1960, which is being held by the Institution of Mining and Metallurgy and will be attended by engineers and scientists from all over the world. Organized by Industrial Exhibitions (Services) Ltd., 9 Argyll Street, London, W.1. — from whom full particulars may be obtained — the exhibition will be open throughout the Congress and will be staged in the two halls which flank the main assembly hall of Church House, Westminster, in which the Congress sessions will be held. The exhibition is designed to show the many overseas delegates to the Congress the range and scope of British mineral processing equipment. It will cover all aspects of the dressing and chemical processing of minerals including coal washing.

The third International Conference on Non-Destructive Testing will be held in Tokyo from March 15-21, 1960. Information is obtainable from the British National Committee for Non-Destructive Testing, 1 Birdcage Walk, Westminster, London, S.W.1.

## Company News

The Compressor Division of Demag, A. G., of Duisberg, has recently signed an agreement with William H. Capper and Co. Ltd., Mayfair House, 8/9 Hertford Street, London, W.1, under which the British firm is appointed sole representative in the U.K. and Northern Ireland for the sale of all the department's products. These include reciprocating, turbo- and axial-flow and rotary compressors, centrifugal blowers, and a wide range of mining equipment. The agreement covers only a very small part of Demag's output. Experienced Demag engineers have been seconded to work permanently from William H. Capper's London office. They are able to advise on and undertake the installation of all the Demag equipment covered by the agreement, and will maintain close liaison with the technical and research departments at Duisberg. In their work in England they will be able to call on the full resources and experience of the contract staff of William H. Capper and Co. Ltd.

Owing to the continuing increase in demand for their products, G. Hunter (London) Ltd., have closed their factory in South Benfleet and moved to Grays, Essex, where they have at present 15,000 sq. ft. of factory space already completed and nearly an acre concreted ready for additional buildings, with ample room for expansion.

A £285,000 extension plan has been announced by F. Perkins Ltd., the Peterborough diesel engine company, to enable a major reorganization of the main factory to be carried out. It will include the erection of three extra bays at the company's big Eastfield factory, which will increase the factory space by approximately 80,000 sq. ft. The plan is linked with a development scheme involving additional plant, equipment, and material handling facilities.

## Book Reviews

**The Colliery Year Book and Coal Trades Directory, 1959.** *Thirty-seventh Edition 1959.* London. Iliffe & Sons Ltd. Pp. 884, price 40s.

The 1959 Edition of *The Colliery Year Book* contains, as usual, full information regarding the coal mining industry and everything connected with it.

While the publishers have followed the pattern of earlier editions, in supplying factual and current information on all aspects of the coal and allied industries, all sections of the book have been revised, the Mines and Quarries Regulations in particular having received special attention, and the Statistical section has been brought up to date. To the many interested in the coal industry's affairs, this book is an invaluable work of reference.

**The Casualties of Industry — a Plea for Justice for Miners,** by Alan Talfan Davies, published by Christopher Davies, Llandybie, Carmarthen. Pp. 24, price 1s.

The purpose of this pamphlet is to discuss the legal position in the coal industry. The author, feeling that there is need for a detailed enquiry into the present system for awarding damages, claims that the machinery for introducing the necessary legislation should be established.

**Optical Mineralogy, 1959.** 3rd Edition. McGraw-Hill Publishing Co., London. Pp. 442, price 66s.

This extensive revision of Rogers and Kerr's work on the use of the polarizing microscope in the study of transparent minerals covers the tremendous amount of new data, discoveries and developments in equipment and techniques which have appeared since the last edition. As in previous volumes, the optical properties of common minerals are given and the optical principles explained. Tables are provided to aid identification. The book fills the need for a comprehensive and up-to-date text book for laboratory classes in optical mineralogy and will also be a useful reference work wherever the polarizing microscope is employed.

**A Basic Language for Work Study.** *British Standard Glossary of Terms, B.S. 3138.* Pp. 38. Obtainable from British Standards Institution, Sales Branch, 2 Park Street, London, W.1. Price 7s. 6d.

So rapid has been the development of work study in Britain since its inception about 30 years ago, that, as the foreword explains, "New words have been created to avoid long explanations, common words have been given special meanings, and sometimes the same words have come to mean different things to different people". This glossary of terms covering varying techniques, recommends the adoption of a standard scale of rating and performance uniform for work of all types.

Economic Bulletin C-1.5, published by the Geological Survey of Malaya, Scrivenor Road, P.O. Box 1015, Ipoh, is that section of the Colombo Plan Report on the Airborne Magnetometer and Scintillation Counter Survey which was effected during the period November, 1956, to May, 1957, over some 1,592 square miles of Johore and Malacca. Included with this extract is an interpreta-

tive summary assessment of the mineral potential indications resulting from the survey. The main findings were summarized in our issue of August 21. The price of this bulletin is \$5 per copy.

The latest publication by the Gauge and Tool Makers' Association, of Standbrook House, Old Bond St., London, W.1, is a booklet entitled *A Simple Guide to Prospective Exporters*, produced with the particular object of assisting firms wishing to enter the field of overseas trading for the first time. The subjects dealt with include representation in foreign markets, how to appoint an agent, method of exporting, methods of payment, etc. Copies are available at 3s. 6d. each from the association.

**DAVIES INVESTMENTS LTD.,** Bankers, still offer 7½ per cent on sums £20 to £500 (withdrawal on demand) with extra ½ per cent on each £500 unit. Details from Investment Dept. MN, Davies Investments Ltd., Danes Inn House, 265 Strand, London, W.C.2.

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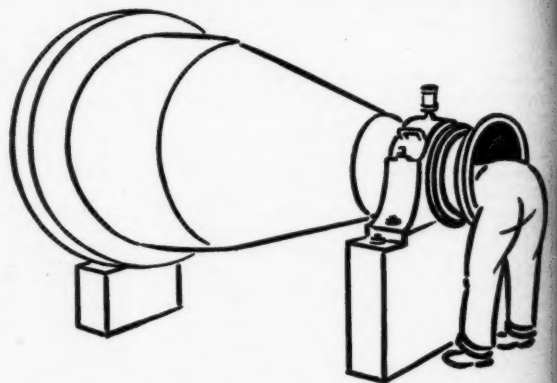
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